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JPRS Report

Nuclear Developments

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SOUTH AFRICA

Steyn: Space Research Needs To Continue

34010042b Johannesburg BEELD in Afrikaans
31 May 89 p 10

[Unattributed article: "RSA Retains Its Program in Space. RSA Will Remain at the Forefront—Danie Steyn"]

[Text] Cape Town—It is impossible for South Africa to justify an extensive space program solely on economic grounds but it is vitally necessary for it to invest in space-related activities, said Minister of Economic Affairs and Technology Danie Steyn yesterday.

At a news conference on a space program for South Africa, he said that if South Africa wishes to retain its technological position in space research, it cannot cut itself off from the rapidly evolving space industry.

South Africa does not aim to put people into space, its goal is further development in the areas of communications, data transmission, navigation, weather prediction, etc.

Steyn said that CSIR [Council for Scientific and Industrial Research] has studied the feasibility of an extensive, coordinated space program.

The government has accepted the study's main recommendation, that it must invest in space-related activities, although it is impossible to justify such a program solely on economic grounds.

The government also accepted the recommendation that it should set up a permanent advisory group to provide it with ongoing advice to optimize its involvement in space technology.

The advisory group will consist of representatives from the Industrial Development Corporation, CSIR, the Department of Posts and Telecommunications, the Weather Bureau, the Department of Trade and Industry, SABC [South Africa Broadcasting Corporation], and the academic space research community.

Although the private sector is not represented in the group, it can get involved in specific studies.

CSIR—which used international and local consultants in its study and approached various international space agencies for information—found that South African industry is capable of supporting a fairly advanced space program of its own.

The extent and timetable of that space program will be determined by the funds and expertise available. Last year South Africa spent 0.025 percent of its gross domestic product for space activities. In contrast, other countries with space programs spend between 0.04 and 0.1 percent of their gross domestic product, with a figure for the United States and the USSR of 0.5 percent.

Dr J. Clark of CSIR said there is excess satellite launching capability worldwide. It is still too expensive to develop a launching system.

Because of this country's involvement in space research, South Africa possesses a team of space researchers who are respected worldwide. The advisory group will see to it that South Africa remains at the forefront of space technology.

South Africa mainly uses the satellite facilities of Intelsat, an international organization in which South Africa owns stock.

International Experts Visit Koeberg Plant

51000008b Johannesburg THE STAR in English
4 Sep 89 p 3

[Article by Therese Anders]

[Text] Cape Town—A delegation from the World Association of Nuclear Operators (WANO) visited South Africa's high-security Koeberg nuclear power station last month.

WANO granted Eskom [Electricity Supply Commission] full membership in Moscow earlier this year.

A party of five European nuclear power plant experts was in South Africa for about three weeks looking at Koeberg's maintenance programme.

Disclosing details of the visit Eskom's head of nuclear liaison, Mr Andre van Heerden, said it was quite possible that Soviet nuclear operators would visit Koeberg in the future, "and they will be most welcome."

He said WANO was formed largely as a result of the C zv.

"Chernobyl indicated to the world that there was a lack of communication between nuclear operations, which was an untenable situation.

"It proved that there is no way an industry such as a nuclear one can isolate itself.

"The radiation coming from an accident of the size and scope of Chernobyl knows no boundaries and is going to cross international borders."

He said every nuclear utility in the world had signed membership, though there was still a question mark over that of Bulgaria. South Africa has been accepted as a full member.

Mr van Heerden said WANO was unusual in that there was no government involvement at any level, and as far as he knew there had been no political opposition to South Africa's membership.

Eskom nuclear officials had already been to Moscow and been well received.

The first delegation to South Africa had included experts from France, West Germany and Belgium, and he believed they went away impressed with the Koeberg facility.

Evacuation of Koeberg Control Center Noted

51000008 Johannesburg THE STAR in English 4 Sep 89 p 3

[Article by Therese Anders]

[Text] Cape Town—For almost a year Eskom [Electricity Supply Commission] has managed to keep the wraps on an incident late last year when the emergency control centre at Koeberg, South Africa's first nuclear power station, had to be evacuated.

The incident had nothing to do with nuclear fall-out, but a lot to do with fall-out from the nuclear installation's toilets.

The emergency centre was out of action for almost a week after sump failures resulted in sewage flooding into the centre to a depth of several centimetres.

"There were some very red faces around here at that time," admitted an Eskom official, who did not want his name used.

He quickly added that while the cleaning squad moved in, the emergency control centre was moved to another part of the building.

In the event of any calamitous accident in which radioactive particles were emitted from Koeberg, the alerting of civil protection services as well as the possible evauwern-insula residents would be controlled from the centre.

Reassuringly the Eskom official said the centre had never had to be used in Koeberg's five years in commercial operation, except for regular emergency planning exercises.

Daya Bay Power Plant Proceeds on Schedule

HK0709034589 Hong Kong SOUTH CHINA MORNING POST in English 7 Sep 89 p 4

[By S. Y. Wai]

[Text] The 1,800-megawatt nuclear power station under construction at Daya Bay in Shenzhen will be completed within its $28.8 billion budget, the Guangdong Nuclear Power Joint Venture Company (GNPJVC) said yesterday.

Mr William Stones, first deputy chairman of the developer, also said that construction was on schedule.

He said the Sino-Hong Kong joint venture had not been affected by the student-led pro-democracy movement in China and the crackdown which followed.

"Some 10,000 mainland workers and 525 expatriates from 18 nationalities are at present closely working together for this project. Civil works are nearing completion and the erection of major pieces of plant is about to commence," he added.

The first 900-megawatt pressurised water reactor at Daya Bay is scheduled to come on stream in October 1992 and the second in July 1993. The containment building of the first reactor unit will be sealed with a concrete dome on September 22.

Mr Stones said training of the station's operations staff had been in progress for almost two years in France and China.

"Great importance is attached by the company to training and all operations and maintenance staff will have to undergo training to prescribed international standards in China and overseas and pass exacting examinations before the power station is commissioned," he said.

A group of 115 key engineers who will be directly involved in operations, maintenance and safety are taking a three-year training course.

The first group of 46 recruits began training in France last April. A second group will go to France in October and a third group next year.

After further training at Daya Bay on simulators, the operators must obtain an operating licence through an examination held by the Chinese National Nuclear Safety Administration.

Paper Describes Civil, Military Nuclear Programs

HK0909003089 Beijing CHINA DAILY in English 9 Sep 89 p 1

[By staff reporter Li Hong]

[Text] China's young nuclear industry, approaching the 25th anniversary of its successfully testing the country's first atomic bomb in October 1964, has "broken new ground" in both the defence and civilian fields this year, CHINA DAILY was told yesterday.

While embarking on an ambitious programme of nuclear energy developments, the industry has recently made "an outstanding breakthrough" in the making of strategic nuclear weapons, according to an official of the China Nuclear Industry Corporation (CNIC).

"This success acknowledges that our nuclear research has "moved one step higher," the official pointed out.

However, the strategic goal for China's nuclear industry is to integrate military products with civil use, with particular emphasis on nuclear power.

China has an ambitious programme to promote the development of nuclear power. A 6-million-kw nuclear power station will have been completed while other stations with a total capacity of 6 million kw will be in construction by the end of this century.

The State is considering importing complete nuclear power plants of 1-million-kw level from abroad which are probably to be installed in Liaoning Province so as to lessen the strain on the demand for energy in Northeast China. At present, negotiations with certain countries are underway, according to the official.

In respect to nuclear power development, China's policy is to "rely mainly on China's own effort while co-operating with foreign partners."

According to the official, China's nuclear power development should be standardized and systemized.

"We will try to utilize pressurized water reactors which are now the most advanced and safest in the world. Meantime, we should try to master comprehensively the design, construction, assembling, testing and management technology of 600,000-kw pressurized water reactor plants, which will be our country's mainstay in nuclear power development," the official said.

With regard to the exploitation of civil products, the output value of them is expected to "triple" between now and 1995.

According to the country's plan, by the end of 1990, China's output value of nuclear non-military products including generated nuclear power will reach 0.8 billion yuan which makes up half of the nuclear industry. By 1993, the percentage will have to reach 60 per cent. By 1995, China will have 70 per cent of its nuclear industry devoted to civil uses with economic turnout of 1.8 billion yuan.

Firm Develops Diesel Engine for Nuclear Plant

OW0709011189 Beijing XINHUA in English 0934 GMT 6 Sep 89

[Text] Dalian, September 6 (XINHUA)—China's first diesel engine for emergency power-generation to be

installed in nuclear power plants has been developed by the Dalian Rolling Stock Plant and passed a technical assessment here Tuesday.

The unit is made for China's first self-designed nuclear-power plant at Qinshan, Zhejiang Province.

Such a power generating diesel engine is said to be the "last guarantee of safety" of the nuclear power plant. It is used to ensure the continuous operation of the nuclear reactor and prevent it from exploding when an accident or unexpected power failure occurs.

This new engine has a capacity of 2,000 kw. All of its technical standards meet those of the 1980s, according to the assessment.

The Dalian Rolling Stock Plant is a leading diesel locomotive producer in China.

Nuclear Waste Disposal Capabilities Discussed

HK0709043389 Hong Kong HONGKONG STANDARD in English 7 Sep 89 p 4

[By Adrian Cheung]

[Text] China was capable of finding the expertise necessary for the disposal of nuclear waste from the Daya Bay nuclear plant, the chairman of the Hong Kong Nuclear Investment Company (HKNIC) said yesterday [6 September].

"Don't underestimate the involvement of the International Atomic Energy Agency of which China is a member," Mr William Stones said.

He said he did not know where China would put the waste but it was looking for strong geological pits in remote areas like the Gobi Desert.

He said China was responsible for the disposal of nuclear waste from the Daya Bay power station.

Mr Stones said the nuclear licensing authority in China was assisted by the French nuclear authorities, and international standards formulated by the Atomic Energy Agency were fully recognised.

He said the nuclear plant project was on schedule and should be completed within budget.

The first 900 negawatt reactor for the $28.8 billion Sino-Hong Kong joint venture is scheduled for commissioning in October 1992 and the second in 1993.

"The erection of major pieces of plant is to commence and civil works are nearing completion," Mr Stones said.

HKNIC, which is wholly owned by China Light and Power, is the Hong Kong partner in the Guangdong Nuclear Power Joint Venture Company, developer of the nuclear plant 30 kilometres northeast of the Sino-Hong Kong border.

Mr Stones, who is also managing-director China Light and Power, said prices of both coal and oil were expected to increase and he believed nuclear power would be cheaper and benefit consumers in Hong Kong.

Training of operations staff for the power station had been going on for almost two years, he said.

He said training included operating a nuclear station and performing duties under French supervision.

At the end of the training, Electricite de France—the Daya Bay project designer—would issue all successful candidates with a qualification identical to that issued to French operators.

The qualification would qualify trained Daya Bay staff to work in France, he said.

SOUTH KOREA

Concern Expressed on North's Nuclear Development

SK2808100589 Seoul HANGUK ILBO in Korean 22 Aug 89 p 2

[Editorial: "A Dead Angle in 'Nuclear Nonproliferation'"]

[Text] The concern over the possibility that North Korea is capable of developing nuclear bombs of its own, which began to draw our attention from the beginning of this year, has now become a real concern of the international community. A report that North Korea was building a plant for reprocessing waste uranium from an experimental nuclear reactor in Yongbyon has brought it out into the open.

It was at the outset of last year that people became suspicious of the fact that North Korea might be building a nuclear fuel reprocessing plant. This suspicion was later confirmed by data gathered by U.S. reconnaissance satellites, and caused a rippling effect in the international community.

This issue was discussed in a meeting of foreign ministers of EC countries held last April, and last July U.S. Secretary of Defense Cheney demanded that North Korea place all its nuclear facilities under supervision of the International Atomic Energy Agency [IAEA].

According to U.S. analysis, with the completion of the nuclear fuel reprocessing plant North Korea will be only a few years away from producing its own nuclear bombs using the plutonium processed in the nuclear fuel reprocessing plant.

It remains to be seen how soon the "a few years" will be, but there is a report that U.S. authorities believe it will be "before 1995."

As is widely known, North Korea is a signatory to the Treaty on the Nonproliferation of Nuclear Weapons, but it has not signed the so-called "safeguards and inspection agreement" of the IAEA. North Korea seems to say it is willing to make a political declaration opposing proliferation of nuclear weapons, but refuses to practice it.

Nevertheless, North Korea has remained silent about international opinion that it should sign a nuclear safeguards and inspection agreement. Reports say that even the Soviet Union is affirmative in its response to the international opinion as such.

While paying lip service to the need to denuclearize the Korean peninsula, North Korea, which has an enormous number of conventional armed forces, is now attempting to even develop nuclear weapons. This will pose a worrisome threat to peace on the Korean peninsula, running counter to the East-West detente which has put a global disarmament on a steady track.

We once again call on North Korea to abandon its double-faced policy—it shouts denuclearization slogans, but refuses to put these slogans into practice—and sign the nuclear safeguards and inspection agreement and place its nuclear facilities under the supervision of the IAEA.

In addition, it must be noted that the Soviet Union plays a very key role in this. Many experts believe that North Korea needs Soviet assistance in core technology for the development of nuclear weapons and the Soviet Union should make plain its stand on the possibility of North Korea developing nuclear weapons.

If North Korea succeeds in developing nuclear bombs, we may find it inevitable to develop our own nuclear weapons, too. Already, the Korean peninsula is a region that has the world's most dense population of nuclear weapons, and this makes it all the more necessary to keep the North and South from entering into a tragic nuclear confrontation.

The reality is that the Korean peninsula is under the nuclear balance of the United States and the Soviet Union, regardless of whether we like it or not.

The practical first step toward preserving peace on the Korean peninsula is to keep the military tension on it from increasing. It is to be hoped that North Korea will realize that signing, at an early date, the nuclear safeguards and inspection agreement, meaning that North Korea will have to open its nuclear facilities to public access, is a necessary step for its own safety.

THAILAND

Future Use of Nuclear Power Discussed

Phichai Says Nuclear Power Plant 'Undesirable'

BK1808090189 Bangkok Domestic Service in Thai 0530 GMT 18 Aug 89

[Text] Commenting on construction of a nuclear power plant, Deputy Prime Minister Phichai Rattakun said Thailand has other energy sources—such as water, coal, or lignite, and natural gas—that can be used to generate electricity. As long as they are available, construction of a nuclear power plant is undesirable.

Phichai said: Although there is an increasing demand for electricity and an electricity shortage in May next year had been predicted, adjustment of the electricity generation program of the Electricity Generating Authority of Thailand has eliminated those problems. Just the opposite, in the projected crisis period Thailand's electricity generation reserve will reach about 10 percent; this should be no problem. He also does not see a problem 20 years from now. For this reason, he does not think a nuclear power plant is necessary at this time.

Minister Wants Feasibility Study

BK2008021489 Bangkok BANGKOK POST in English 20 Aug 89 p 3

[Text] Prime Minister's Office Minister Anuwat Watthanaphongsiri said yesterday he wanted a feasibility study for building a nuclear power plant in Thailand to be taken "in earnest".

An ad hoc committee will be formed to conduct a study and provide the public with facts about existing nuclear power plants abroad, he said.

It would probably take three or four years to complete the study, he said.

Dr Anuwat, recently appointed to oversee the Electricity Generating Authority of Thailand (EGAT), said it was necessary to look for new energy sources to meet the ever-growing demand since the country was running out of other sources of energy.

The country's gas and lignite reserves would drop considerably in the next 10-20 years, he said.

A nuclear power plant could produce from 500 to 2,000 megawatts of electricity, he said, far more than lignite-fired or hydroelectric stations could make.

Its potential as an alternative energy justifies a feasibility study, he said.

The minister said he had visited several nuclear power plants in the United States and the Soviet Union while he was science minister.

Dr Anuwat will chair a meeting of representatives of EGAT, Metropolitan Electricity (MEA) and Provincial Electricity (PEA) authorities next Wednesday to discuss investment in new projects.

Electricity consumption in the provinces has exceeded consumption in areas under the MEA's jurisdiction due to the rapid industrial expansion and construction of hotels and condominiums in the provinces, he said.

A plan to build a dam across the Pak Mun River in Ubon Ratchathani is under study, he said.

INTRABLOC AFFAIRS

International Atomic Energy Session Held

AU3108133789 Sofia BTA in English 1310 GMT 31 Aug 89

[Text] Sofia, August 31 (BTA)—On August 29-30 a session of the representatives of the International Agency on Atomic Energy (MAGATE) socialist member-countries was held in Sofia with the participation of delegations of the Belorussian SSR, Bulgaria, Vietnam, the GDR, the PDR of Korea, Cuba, Mongolia, Poland, Romania, the USSR, the Ukrainian SSR, Hungary and Czechoslovakia.

A representative of the CMEA Secretariat also took part in the session as observer.

At the session that passed in a friendly and businesslike atmosphere the participants exchanged views on the problems of strengthening international cooperation in the safe and peaceful use of atomic energy in connection with the 33rd Regular Session of the MAGATE General Conference.

HUNGARY

Results of Leakage Tests at Power Plant

25020265a Budapest ENERGIA ES ATOMTECHNIKA in Hungarian July 89 pp 147-152

[Article by Denes Bodizs and Gabor Keomley, of the Budapest Technical University, Nuclear Technology Institute, and Tamas Pinter, of the Paks Nuclear Power Plant Enterprise: "Fuel Cladding Airtightness Control at Nuclear Power Stations"]

[Excerpts] The fuel for the reactors of the pressurized water nuclear power plant at Paks is uranium mildly enriched in ^{235}U in the form of UO_2. In the initial period of the operation of the reactor the activity of fission products in the primary cycle water is caused by the surface ^{235}U contamination of the fuel element cladding. Calculations and experiments prove that the concentration of fission products in the heat transfer medium is very low in the case of sound fuel element cladding. But in the course of operation of the power plant, as a result of fatigue and corrosion processes, the airtightness of the cladding can decrease. In such a case a fraction of the fission products goes into the heat transfer medium through microscopic cracks, thus increasing the radioactive concentration of the medium. Checking the soundness of the cladding during operation is of vital importance from the viewpoint of operational safety.

A number of measurement methods, differing in their physical, chemical and technical aspects, have been developed to check the airtightness of the fuel element cladding.

The procedure described by us makes possible a semi-continuous monitoring of the state of the fuel cladding during operation throughout the campaign.

For the tests we use samples taken from the primary cycle heat transfer medium, determining the concentration of radioactive iodine by gamma spectrometric means. The absolute concentration values and the relative figures for these make it possible to check the cladding of the fuel elements making up the zone. The disadvantage of the method is that it provides information only about the state of the zone as a whole; it is not possible to unambiguously locate the damaged fuel element. Its advantage is providing continuous information during operation and the fact that it can serve as a basis for deciding whether it is necessary to do an integrity test at the end of the campaign, during reloading—which means a lot of work and time and increases costs.

So we should emphasize that the procedure used does not replace but rather supplements with preliminary information, calling attention to possible problems, the studies already developed at the Paks Nuclear Power Plant to identify cassettes containing unsound fuel elements, the so-called KGO tests outside the zone and the so-called "sipping" tests within the zone. [passage omitted]

Determining Surface Contamination

The Technical Plan gives a value of 10^{-9} g $^{235}U/cm^2$ for maximum surface contamination of the fuel element cladding (and gives a probable value of $2*10^{-10}$ g $^{235}U/cm^2$).

When starting the campaign, and when stable operational parameters are already set, one must determine the actual surface contamination, or rather the corresponding concentrations of radioactive iodine in the heat transfer medium. These concentrations actually characterize the "0" state of the zone and a possible increment can be attributed to failures during operation. [passage omitted]

Table 2. Surface Contamination When Starting Four Campaigns of the Two Blocks Studied

Block/Campaign	Surface Contamination (g $^{235}U/cm^2$)
1/1	$3.5*10^{-11}$
1/2	$4.4*10^{-11}$
1/3	$4.4*10^{-11}$
2/1	$2*10^{-11}$
2/2	$1.4*10^{-11}$

We have summarized the results of our calculations in Table 2. The values are extraordinarily low compared to the maximal and the probable surface contamination standards.

Evaluation of the Leakage Process

When studying the mechanism of leakage of fission products through the fuel element cladding into the heat transfer medium it is especially important, from the viewpoint of determining the leakage constant characterizing the process and the number of injured fuel elements, to determine the value of R_i/B_i where R_i is the exit speed of the i-th product into the heat transfer medium and B_i is the formation speed of the i-th product in the fissioning material. [passage omitted]

This value, R/B, depends on the leakage constant, mu(s^{-1}), which indicates the magnitude of a possible failure in the cladding and which increases with the size of the fault. (Mu_1 is used when the movement of the fission products within the fuel element is unobstructed and mu'_1 is used when there are stoppages within the fuel element). [passage omitted]

We calculate the total number of inhermetic fuel elements (N_1 shown with the corresponding isotope) on the basis of the $^{132-135}I$ isotopes and then get an average of these (N_1 shown without any isotope designation). N_1 is calculated by subtracting the measured surface contamination from the measured value. [passage omitted]

Table 3 shows the data pertaining to campaigns 2 and 3 of block 1 and table 4 shows the data pertaining to campaigns 1 and 2 of block 2. (A similarly detailed analysis was not done for the first campaign of block 1).

Table 3. Number of Inhermetic Fuel Elements (Campaigns 2 and 3 of Block 1)—showing values of N_1 for various isotopes

Time Sample Taken	mu_1 I-132	I-133	I-134	I-135	Average	mu'_1 I-132	I-133	I-134	I-135	Average
Block 1, Second Campaign										
7/84	0.03	0.17	0.09	0.14	0.11	0.07	0.38	0.3	0.42	0.29
8/84	0.12	0.14	0.19	0.15	0.15	—	—	—	—	—
9/84	—	—	—	0.12	0.7	0.44	0.58	0.18		
10/84	0.08	0.11	0.1	0.09	0.09	0.42	0.31	1	0.44	0.54
11/84	0.06	0.05	0.1	0.07	0.07	—	—	—	—	—
12/84	0.09	0.14	0.23	0.12	0.14	—	—	—	—	—
1/85	0.07	0.12	0.14	0.09	0.1	—	—	—	—	—
2/85				could not be evaluated, mu not on curve						
3/85	0.05	0.06	0.08	0.04	0.06	—	—	—	—	—
5/85	0.09	0.05	0.14	0.13	0.1	—	—	—	—	—
Block 1, Third Campaign										
6/85	0.03	0.06	0.2	0.3	0.15	—	—	—	—	—
7/85	0.08	0.2	0.15	0.15	0.18	0.35	0.4	0.4	0.33	—
8/85	—	—	—	0.2	0.4	0.4	0.4	0.4		
9/85	—	—	—	—	0.1	0.2	0.2)0.3	0.2		
10/85	0.07	0.1	0.13	0.14	0.11	0.2	0.2	0.4	0.4	0.3
11/85	0.05	0.07	0.08	0.08	0.07	—	—	—	—	—
12/85	0.01	0.04	0.03	0.05	0.03	—	—	—	—	—
1/86	0.04	0.07	0.06	0.07	0.06	—	—	—	—	—
2/86	0.05	0.06	0.07	0.08	0.07	—	—	—	—	—
3/86	—	—	—	—	0.06	0.1	0.1	0.1	0.1	
4/86	0.04	0.05	0.06	0.06	0.05	—	—	—	—	—
5/86	0.03	0.05	0.05	0.05	0.05	—	—	—	—	—

Table 4. Number of Inhermetic Fuel Elements (Campaigns 1 and 2 of Block 2)—showing values of N_1 for various isotopes (the mu'$_1$ values are not shown as $K_{mu\ 1}$ was always equal to or less than 3

Time Sample Taken	I-132	I-133	mu_1 I-134	I-135	Average
Block 2, First Campaign					
9/84	—	—	—	0.004	0.004
10/84	—	0.01	—	0.01	0.01
11/84	0.01	0.01	0.02	0.03	0.02
1/85	0.04	0.03	0.06	0.07	0.05
2/85	0.03	0.04	0.04	0.08	0.05
3/85	0.05	0.07	0.1	0.1	0.08
4/85	0.02	0.01	0.02	0.03	0.02
5/85		could not be evaluated, mu not on curve			
6/85		could not be evaluated, mu not on curve			
7/85	0.03	0.03	0.06	0.07	0.05
8/85	0.04	0.04	0.07	0.07	0.06
9/85	0.03	0.05	0.05	0.09	0.06
Block 2, Second Campaign					
10/85	0	—	0.01	—	0.01
11/85		could not be evaluated, mu not on curve			
12/85		could not be evaluated, mu not on curve			
1/86		could not be evaluated, mu not on curve			
2/86	0.02	0.01	0.02	0.02	0.02
3/86	0.01	0.02	0.02	0.01	0.02
4/86			could not be interpreted		
5/86	0.06	0.09	0.04	0.1	0.07
6/86	0.01	0	0.01	—	0.01
7/86	0.07	0.1	0.1	0.2	0.1
8/86	0.1	0.1	0.2	0.2	0.2
9/86	0.1	0.1	0.2	0.2	0.2

Reviewing the data in the tables it can be established that the number of inhermetic fuel elements is regularly smaller than one, which means that during the four campaigns studied it was not possible to show by calculation a damaged fuel element in the zones. (In connection with the first campaign of block 1, evaluated only qualitatively, we came to the same final conclusion.) [passage omitted]

Summary

We can establish the following by evaluating the results in a summary fashion:

—Comparing the radioactive concentrations defined as the limiting case and those measured during the campaigns it is striking that the measured values are lower by about four orders of magnitude.

—The radioactive concentrations corresponding to surface contamination remain below that considered maximal contamination by 1-2 orders of magnitude. The measured surface contaminations move around 10 percent of the probable value.

—The radioactive concentrations during the campaigns hardly exceed that corresponding to the surface contamination, which indicates that one need not reckon with significant fuel element failure.

—The detailed analysis during campaigns 2 and 3 of block 1 and campaigns 1 and 2 of block 2 were unable to indicate an inhermetic, damaged fuel element in the zone.

These studies, during operation, justified the decision that there was no need to check the integrity of the fuel elements during reloading, which significantly reduced the downtime of the reactor and understandably increased the reactor time which could be turned to power production. [passage omitted]

3-Year Operation of Cyclotron Reviewed

25020259 Budapest FIZIKAI SZEMLE in Hungarian No 5, 1989 pp 194-196

[Article by T. F.: "Hungary's Cyclotron is Three Years Old"]

[Text] On 14 December 1988 the physics work committee of the Debrecen Committee of the Academy and the nuclear physics and applications group of the Lorand Eotvos Physics Society held a full day scientific session at ATOMKI [the Nuclear Research Institute] with the title "Hungary's Cyclotron is Three Years Old." The purpose of the session was a review of the more important results achieved by the cyclotron in the areas of

atomic and nuclear physics basic research and in practical applications. The program was participated in by about one hundred people from Academy research institutes, various universities of the country, enterprises combined in the Debrecen Scientific Technical Park, clinics, the National Atomic Energy Committee, etc.

The Hungarian cyclotron was put into operation at the Nuclear Research Institute of the MTA [Hungarian Academy of Sciences] in Debrecen in November 1985. The cyclotron can accelerate hydrogen and helium nuclei to a maximum energy of 20-26 MeV, with significant (25-50 microamperes) intensity. The accelerating equipment was designed and manufactured in the Yefremov Scientific Research Institute for Electrophysical Equipment in Leningrad; the bulk of the physical measurement equipment was developed domestically. Creation of the cyclotron laboratory was the largest scientific investment in Hungary in the first half of the 1980's. In addition to the accelerator, the measurement equipment and the beam channels serving to conduct the accelerated particles the laboratory includes a measurement and computer center, an isotope laboratory, an area for medical applications, laboratory facilities, workshops, etc.

Basic research, applications and developmental work programs are conducted with the cyclotron. Basic research includes nuclear spectroscopy, nuclear reaction and ion-atom collision studies. The applications areas are isotope production, material studies with nuclear physics methods and radiation with charged particles (or neutrons). The developments connected with the cyclotron involve accelerator physics and nuclear electronics.

Starting up the cyclotron transformed the life of ATOMKI; in the course of the investment the fixed assets of the institute doubled and it became possible to acquire very valuable, modern instruments. The everyday work of about fifty institutional colleagues is connected with the laboratory. The very valuable equipment of the laboratory is at the disposal of other institutions as well. The new research possibilities also aided the building up of new international contacts and ATOMKI is linked ever more broadly into international scientific work.

In the spring of 1986 the cyclotron achieved the parameters guaranteed in the specifications and it has operated regularly ever since. In the first three years about 4,100 hours were turned to basic research and 2,000 hours to applications; maintenance, repairs and accelerator development took place in the remainder of the time.

The atomic physics studies are directed at a study of the electron and electromagnetic (X-ray) radiation arising in ion-atom collisions. With a special electron spectrometer developed at ATOMKI they succeeded in achieving a better energy release than in earlier studies. Studies done with the special technique and posing new problems led to internationally new results and organically supplemented corresponding measurements done at Dubna.

Most of the user time in the first three years of operation of the cyclotron, about 2,100 hours, were turned to basic nuclear spectroscopy research. The purpose of the studies was a systematic examination of the structure of indium and antimony nuclei in a broad nuclear range with complex electron and gamma spectroscopy methods. The studies resulted in fundamentally new information about 11 indium and antimony isotopes. This includes observation of more than 670 gamma radiations (350 of them new internationally) and 230 nuclear levels (105 of them new internationally) and a determination of their characteristics; it includes a uniform quantum mechanical description of the nuclear structure with a new nuclear model, the recognition of new systematic interdependencies in the nuclear structure, a clarification of the role of different types of reactions between the protons and neutrons forming the nucleus, etc. The superconducting magnetic electron spectrometer developed by ATOMKI contributed greatly to the success of these studies; it is a unique piece of equipment for similar type cyclotrons on a world scale.

The chief tool for the nuclear reaction research being done with the cyclotron is the scatter chamber and multidetector measurement system developed jointly with the Particle and Nuclear Physics Research Institute of the Central Physics Research Institute (KFKI). The research was directed at a clarification of the potential behavior of a nuclear physics model describing the scatter of charged particles. In the near future they plan to start measurements requiring particle identification.

On order and as part of outside cooperation they have done nuclear analytic studies to determine the oxygen content and the presence of other trace contaminants in high purity metals (e.g., aluminum and gallium). They have also studied the element composition of glasses and lubricating oils. They set up (with OMFB [National Technical Development Committee] support) a measurement laboratory for the domestic adoption of the surface activation technique which makes it possible to check wear processes (corrosion, erosion) in parts. Radiation for a similar program at the MTA Isotope Research Institute in Budapest was also done with the Debrecen cyclotron. Isotope production is an important applications area for the cyclotron. The largest user of the isotopes produced is medical diagnostics. At present they are producing Ga-67 and I-123 isotopes for medical purposes, in cooperation with the MTA Isotope Research Institute; these are used for diagnosis of tumorous and inflamed changes and for heart tests. Domestic production of the isotope In-111 is being introduced. There are also experiments to produce the short half-life isotopes C-11, O-15, N-13 and F-18 and use of them as compound markers. They produce a stripped Na-24 isotope for the Ecology Faculty of the KLTE [Lajos Kossuth Science University] which is used to study the water metabolism of trees.

In addition to the analytical tasks the neutron sources of the cyclotron are used for medical biology, plant stimulation and dosimetric radiation purposes. The chief goal of the radiation work done in cooperation with the Radiology Clinic and Medical Biology Cyclotron Laboratory of the Medical Sciences University in Debrecen is

to get radiobiology experience for neutron therapy studies. Similar cooperation will begin in the near future with the National Radiobiology and Radiohealth Institute. Precise nuclear data are also important for solving the practical tasks; the variable energy Debrecen cyclotron provides good opportunities for measuring these data. In recent years they determined the excitation function connected with production of the Ga-67 isotope. Significant developmental work, making instruments and aligning activity were needed for the successful realization of the applications mentioned. These include development of the radiation beam channels, adaptation and alignment of gas target neutron sources, installing a neutron collimator which could also be used for human purposes, etc.

ARGENTINA

Former CNEA Head Says Nuclear Plan Delayed

PY3008041289 Buenos Aires NOTICIAS ARGENTINAS in Spanish 1936 GMT 29 Aug 89

[Text] Bahia Blanca, 29 Aug (NA)—Former National Commission for Atomic Energy (CNEA) President Vice Admiral, retired, Carlos Castro Madero, has said in Trelew that the implementation of the Argentine nuclear plan has been delayed by 6 to 8 years.

Castro Madero noted that the construction of a nuclear dump in the Chubut locality of Gastre will "promote development in an area that has no resources." He minimized the danger that the dump may pose to the population.

He maintained that "the people who worry about the problems that may be generated by the use of nuclear energy are the same who oppose the possible resolution" of the issue.

In statements after a lecture he delivered in Trelew, Castro Madero, who is a nuclear energy specialist, provided details of the construction of a dump in Gastre.

"The Ezeiza nuclear plant neighbors have not yet complained about the pools where the radioactive residue is being stored, despite the fact that the residue is kept in demineralized water in a temporary storage place. There have been complaints, however, about something that has not even been built in Gastre," he noted.

Gastre is a desert area that offers no chances for farming or mining and that has no tourist attraction because of its monotonous landscape.

"To build a dump in Gastre will be to promote development in an area that has no resources at all," Castro Madero said.

He added that nuclear energy is an appropriate source of power, because "oil and gas, which have been used for essential purposes, are nonrenewable resources."

"Coal is cheap but it causes environmental problems, and since hydroelectric power is limited, the alternative is nuclear energy," Castro Madero said, adding that "World Bank studies have concluded that nuclear generation is the cheapest way to increase our generation capacity."

Castro Madero added that the implementation of the Argentine nuclear plan has been delayed by 6 to 8 years, because while the construction of the Atucha II plant should have been completed in 1987 or 1988, only 50 percent of the project has been completed.

If this project is not stopped, the plant can be ready for operation in 1993 or 1994, Castro Madero concluded.

Embalse Nuclear Plant Starts Operations

PY3108231689 Buenos Aires NOTICIAS ARGENTINAS in Spanish 2220 GMT 31 Aug 89

[Text] Buenos Aires, 31 Aug (NA)—Energy Under Secretary Juan Legisa this evening announced that the Embalse nuclear plant began operating today and that, consequently, there will be no power rationing in September and October.

BRAZIL

Text of INB Annual Report for 1988

51002058 Brasilia CORREIO BRAZILIENSE in Portuguese 7 Jul 89 pp 10, 11

[Text] Nuclear Industries of Brazil, S.A. (INB) presents its Annual Report to the Shareholders for the year ended 31 December 1988: We are pleased to submit to you the Report of Activities and the Financial Statements which sum up the corporate operations of the INB Group in 1988. The year 1988 was marked by the restructuring of the Brazilian nuclear program. The Nuclear Sector Recovery Program, initiated in 1987, led to the creation of the Interministerial Working Group (GTI) through Interministerial Ordinance No 48 of 16 May 1988. The purpose of the group was to find solutions for the nuclear sector in Brazil. The Working Group consolidated its conclusions in Statement of Justification No 007 of 31 August 88, approved by the president of Brazil on that same date. The recommendations contained in Statement of Justification 007 were then translated into Decree-Law No 2,464 and Decrees Nos 96,620; 96,621; 96,622; and 96,623, all dated 31 August 1988. Decree-Law No 2,464 changed the name of the corporation from Empresas Nucleares Brasileiras S.A. (Nuclebras) to Industrias Nucleares do Brasil S.A. (INB), and transferred the shares of its capital stock from the federal government to the National Commission for Nuclear Energy (CNEN). The document transferring those shares was drawn up on 20 September 1988. That same decree-law, in Article 3, ordered that the following be given to the federal government in payment of its loans to INB and without appraisal: (a) shares of INB representing the capital of Nuclebras Engineering S.A. (NUCLEN), for later transfer to Brazilian Electric Power Stations S.A. (Electrobras); the shares were transferred to the federal government; (b) property that constituted the assets of the Nuclear Technology Development Center (CDTN), for later transfer to the CNEN; and (c) property that constituted the assets of the Center for Advanced Training with Simulators (CTAS) and of the nuclear electric power plants Angra II and Angra III, for later transfer to Furnas Electric Power Stations S.A. as capitalization. Article 4 of the decree-law cancels all debts of NUCLEBRAS and its subsidiaries toward the federal government as of the date of publication of that legal measure. Article 5 made the federal government the successor in the rights and obligations of Nuclebras and

its subsidiaries resulting from internal and external credit transactions consummated as of the date of publication of that decree-law, as well as in other monetary obligations existing on that same date, except for those of a labor law and social security nature. Decree No 96,620 ordered the creation of the Executive Council on Nuclear Policy (CSPN) to advise the president of Brazil in the formulation of nuclear policy and the establishment of governmental directives regarding nuclear energy. Decree No 96,621 ordered the inclusion of Nuclebras Isotopic Enrichments S.A. (NUCLEI) and Nuclebras Mining Assistance S.A. (NUCLAM) in the Federal Denationalization Program for purposes of their dissolution—both are subsidiaries of INB—and also ordered that the rights of the minority shareholders in those companies be guaranteed by INB. Decree No 96,622 authorizes the establishment of Uranium of Brasil S.A. as a subsidiary of INB, with headquarters in the city of Caldas, Minas Gerais State. The capital of the subsidiary can be paid up by either private or public subscription, provided that INB holdings in no event fall below 51 percent of the total voting stock. Decree No 96,623 includes the subsidiaries Nuclebras Heavy Equipment S.A. (NUCLEP) and Nuclebras Mining and Chemicals Ltda (NUCLEMON) under the Federal Denationalization Program for purposes of their privatization and provides that the INB will guarantee the rights of the minority shareholders. On 4 October 1988, Uranium of Brasil S.A. was established with an authorized capital of 25 billion cruzados, and INB subscribed and paid up 12.5 billion of that total, 12.35 billion through conveyance of the assets that had been part of the permanent assets of INB related to activities to be carried out by the new subsidiary, plus inventories of the Pocos de Caldas Industrial Complex. INB financial statements show a loss for the year that, essentially, results from the negative earnings from the monetary indexation of the balance sheet and the write-offs taken from the deferred assets for projects that were discontinued or are no longer consistent with the company's stated purpose. That loss was partially reduced by the financial earnings received on the credits granted to the subsidiaries that were set up because of the dation in payment that INB made, using assets of which it was the sole owner, for the account of what the federal government absorbed under Decree-law No 2,464. The increase in the net working capital results, in the last analysis, from the measures enacted on 31 August 1988. As a consequence of the institutional changes that occurred, the Board of Directors of Nuclear Industries of Brazil S.A. is now composed of the following people: chairman, John Milne Albuquerque Forman; and members, Mario Penna Bhering, Helcio Modesto da Costa, Sergio Eyer Joras, Oscar Sala, Michal Gartenkraut, Adalberto de Souza Coelho, and Rubens Yoshieti Yonamine. We take this occasion to respectfully express our appreciation to the president of Brazil, to the minister and chief of the National Defense Advisory Secretariat, to the minister of Mines and Energy, and to other government officials for their trust in us and the support received.

Brasilia, 2 June 1989
John Milne Albuquerque Forman, chairman of the Board
Sergio Eyer Joras, director of operations

Balance Sheet—in Thousands of Cruzados

ASSETS	By Full Indexation and Company Legislation On 31 Dec 88	By Company Legislation On 31 Dec 87	LIABILITIES	By Full Indexation and Company Legislation On 31 Dec 88	By Company Legislation On 31 Dec 87
CURRENT ASSETS	15,072,454	3,386,951	CURRENT LIABILITIES	6,359,989	153,231,803
Cash, bank accounts	83,402	6,579	Suppliers	4,046,400	3,787,539
Financial investments	4,269,787	431,455	Financing and loans	0	141,269,053
Accounts receivable	8,577,571	1,378,257	Social security, tax obligations	1,800,777	6,949,232
Deposits in blocked accounts	0	216,885	Other	512,812	1,225,979
Advances to suppliers	345,288	79,677	LONG-TERM LIABILITIES	9,430,981	194,099,230
Other credits	1,044,757	144,224	Suppliers	0	5,000,150
Inventories	736,688	983,204	Financing and loans	0	181,057,807
Expenses for following year	14,961	146,670	Special credit from federal government	0	0
		Reserve for income tax		4,846,375	

Balance Sheet—in Thousands of Cruzados

ASSETS	By Full Indexation and Company Legislation On 31 Dec 88	By Company Legislation On 31 Dec 87	LIABILITIES	By Full Indexation and Company Legislation On 31 Dec 88	By Company Legislation On 31 Dec 87
CURRENT ASSETS	15,072,454	3,386,951	CURRENT LIABILITIES	6,359,989	153,231,803
LONG-TERM RECEIVABLES	375,551,195	334,666,685	Other	0	22,736
Accounts receivable-DL 2464	297,934,916	0		0	190,927,068
—Federal government	2,688,501	0	Credit for future increase of capital	9,430,981	3,172,162
—Subsidiaries	295,246,415	0	FUTURE EARNINGS	0	1,071,428
Services to be billed	0	65,694,748	Future earnings	0	1,071,428
Loans and financing	2,354,411	256,439,681	NET WORTH	470,348,829	17,310,052
Deferred income tax	0	4,846,375	Authorized capital	56,879,706	26,933,458
Other	11,703,615	1,223,290	Less: Capital to be subscribed	9,775,488	4,629,680
	311,992,942	328,204,094	Subscribed and paid-up capital	47,104,218	22,303,778
			Less: Shares not yet sold/transferred	114	0
Advances for future capital increase	63,558,253	6,462,591		47,104,104	22,303,778
FIXED ASSETS	95,516,150	27,658,877	Monetary indexation of capital	384,401,244	24,800,154
Investments	58,932,171	3,138,659	Paid-up capital, current value	431,505,348	47,103,932
Plant and equipment	14,216,568	8,482,656	Capital reserve	498,414,966	8,890,452
Deferred	22,367,411	16,037,562	Reserve for reappraisal	10,557,728	0
			Accrued losses	(470,129,213)	(38,684,332)
TOTAL ASSETS	486,139,799	365,712,513	TOTAL LIABILITIES	486,139,799	365,712,513

The explanatory notes are an integral part of the financial statements

Statement of Shareholders' Equity - in Thousands of Cruzados

According to Company Legislation

	Paid-up Capital		Capital Reserves					
	Capital	Monetary Indexation of Capital	Subsidies for Invest-ments	Absorption (DL 2464) and Grants	Tax Incentives	Reserve for Reappraisal	Accrued Losses	Totals
BALANCES ON 31 DEC 1986	4,119,165	2,851,025	2,030,919	186	114	0	(10,452,543)	(1,451,134)
Capital increase, Reg Gen Ass 24 Apr 87	2,851,025	(2,851,025)	0	0	0	0	0	0
Capital increase, Reg Gen Ass 10 Sep 87	4,182,114	0	0	0	0	0	0	4,182,114
Capital increase, Spec Gen Ass 18 Dec 87	11,151,474	0	0	0	0	0	0	11,151,474
Research grants	0	0	0	75	0	0	0	75
Monetary indexation	0	24,800,154	6,858,439	333	386	0	(35,296,683)	(3,637,371)
Net profit for year	0	0	0	0	0	0	7,064,894	7,064,894
BALANCES ON 31 DEC 87	22,303,778	24,800,154	8,889,358	594	500	0	(38,684,332)	17,310,052
Capitalization	828	0	0	0	0	0	0	828
Capital increase, Reg Gen Ass 23 Apr 88	24,799,612	(24,799,612)	0	0	0	0	0	0
Absorption—DL 2464	0	0	0	208,191,315	0	0	0	208,191,315
Shares not sold/ transferred	(114)	0	0	0	0	0	0	(114)
Reappraisal of assets	0	0	0	0	0	4,451,371	0	4,451,371
Conversion reappraised assets to cash	0	0	0	0	0	(51,047)	51,047	0
Monetary indexation	0	384,400,702	72,542,271	208,786,850	4,078	6,157,404	(315,686,444)	356,204,861
Net loss for year	0	0	0	0	0	0	(115,809,484)	(115,809,484)
BALANCES ON 31 DEC 1988	47,104,104	384,401,244	81,431,629	416,978,759	4,578	10,557,728	(470,129,213)	470,348,829
				By Full Indexation				
BALANCES ON 31 DEC 87	406,705,022	24,799,612	81,431,629	7,218	4,578	0	(354,370,776)	158,577,283
Capitalization	1,196	0	0	0	0	0	0	1,196
Capital increase, Reg Gen Ass 28 Apr 88	24,799,612	(24,799,612)	0	0	0	0	0	0

Statement of Shareholders' Equity - in Thousands of Cruzados

According to Company Legislation

	Paid-up Capital		Capital Reserves					
	Capital	Monetary Indexation of Capital	Subsidies for Investments	Absorption (DL 2464) and Grants	Tax Incentives	Reserve for Reappraisal	Accrued Losses	Totals
Absorption—DL 2464	0	0	0	416,971,541	0	0	0	416,971,541
Shares not sold/transferred	(482)	0	0	0	0	0	0	(482)
Reserve for reappraisal	0	0	0	0	0	10,608,775	0	10,608,775
Conversion reappraised assets to cash	0	0	0	0	0	(51,047)	51,047	0
Net loss for year	0	0	0	0	0	0	(115,809,484)	(115,809,484)
BALANCES ON 31 DEC 88	431,505,348	0	81,431,629	416,978,759	4,578	10,557,728	(470,129,213)	470,348,829

The explanatory notes are an integral part of the financial statements

Income Statement - In Thousands of Cruzados

	By Full Indexation	According to Company Legislation	
	On 31 Dec 88	On 31 Dec 88	On 31 Dec 87
Gross receipts from sales & services	16,378,711	2,238,846	1,659,727
Returns, discounts, taxes and contributions on sales	1,816,520	254,078	84,102
Net operating income	14,562,191	1,984,768	1,575,625
Cost of products and services sold	12,703,958	596,096	237,342
Net operating profit	1,858,233	1,388,672	1,338,283
Operating expenses	(75,801,426)	(177,134,749)	15,502,355
Financial (Income) or Expenses	(51,687,457)	(205,604,011)	9,255,984
—Income	(334,587,460)	1,264,211,320	269,638,838
—Expenses	(386,274,917)	1,058,607,309	278,894,822
Administrative	64,517,580	21,857,909	3,419,373
Amortization	3,850,231	1,458,245	470,436
Costs not incurred in production	2,683,274	1,133,807	0
Prospecting and research	6,841,707	1,736,378	454,529
Equity accounting	2,282,923	2,282,923	1,901,990
Adjustments in economic plans	0	0	43
Gains on monetary items	104,289,684	0	0
Operating profit (loss)	77,659,659	178,523,421	(14,164,072)
Non-operating income (expenses)	(160,121,460)	(84,172,302)	1,458
Monetary indexation of balance sheet	0	(203,326,125)	25,973,772
Monetary indexation of net worth	0	356,204,861	(3,637,371)
Monetary indexation of fixed assets	0	152,878,736	22,336,401
Monetary change in financing of plant and equipment	33,347,683	6,834,478	4,746,264
Profit (loss) before income tax	(115,809,484)	(115,809,484)	7,064,894
Reserve for income tax	0	0	4,846,375
Deferred income tax	0	0	4,846,375
Net profit (loss) for year	(115,809,484)	(115,809,484)	7,064,894
Profit (loss) per share (in Cz$1.00)	(495.99)	(495.99)	30.26

The explanatory notes are an integral part of the financial statements

Statement of Changes in Financial Position - In Thousands of Cruzados

	By Full Indexation	According to Company Legislation	
	On 31 Dec 88	On 31 Dec 88	On 31 Dec 87
ORIGINS OF FUNDS	1,704,798,683	231,619,745	(104,454,929)
In operations			
—Profit (Loss) for the year	(115,809,484)	(115,809,484)	7,064,894
Plus: Expenses not representing outflow of funds	167,510,100	773,096,206	175,712,014
—Writeoffs of fixed assets	158,390,528	84,242,035	35,393
—Depreciation & amortization	7,082,902	2,627,767	564,820
—Monetary changes in long-term debt	0	451,954,259	159,294,203
—Monetary indexation of credits for capital	0	28,663,097	9,069,233
—Net loss on equity interest in controlled companies	2,036,670	2,282,923	1,901,990
—Reserve for income tax	0	0	4,846,375
—Earnings from monetary indexation	0	203,326,125	0
Less: Receipts not representing inflow of funds	30,192,404	1,225,383,399	299,332,212
—Charges on financing granted	0	935,157,741	200,041,991
—Charges on transactions with controlled companies	0	235,552,086	13,978,833
—Positive earnings from monetary indexation	0	0	25,973,772
—Monetary change in advances for future increases in capital of controlled companies	0	53,477,822	4,187,564
—Deferred income tax	0	0	4,846,375
—Charges on services to be billed	0	0	50,052,992
—Reduction in earnings for future years	10,956,408	1,195,750	250,685
—Gains, net of losses, long-term monetary items	19,235,996	0	0
From shareholders	120,300,703	26,646,000	7,325,111
—Credits for future capital increase	120,300,703	26,646,000	7,325,111
From third parties	1,562,989,768	773,070,422	4,775,264
—Long-term financing	20,870,163	3,117,186	4,454,560
—Increase in other long-term liabilities	198,655	82,204	45,514
—Reduction in working capital resulting from paying short-term obligations—DL 2464 of 31 Aug 88	1,541,920,950	769,871,032	0
—Other	0	0	275,190
APPLICATION OF FUNDS	323,420,965	73,062,428	25,655,847
To fixed assets	9,292,034	3,108,477	763,292
--Increase in investments	2,083,540	1,290,215	67
—Acquisitions for plant and equipment	688,750	381,961	190,613
—Increase in deferred	6,519,744	1,436,301	572,612
To other purposes	314,128,931	69,953,951	24,892,555
—Increase in services to be billed	135,279,265	23,081,376	7,111,746
—Increase in transactions with controlled companies	52,246,463	14,131,080	2,753,496
—Increase in other long-term receivables	290,823	69,247	8,347
—Transfer of long-term liabilities to short- term	126,312,380	32,672,248	15,018,966
Increase (reduction) in net working capital	1,381,377,718	158,557,317	(130,110,776)

	Balances on		Change to: Company Legislation		Full Indexation
Represented by:	31 Dec 88	31 Dec 87	31 Dec 88	31 Dec 87	31 Dec 88
Current assets	15,072,454	3,386,951	11,685,503	2,676,456	(15,953,970)
Current liabilities	6,359,989	153,231,803	(146,871,814)	132,787,232	(1,397,331,688)
	8,712,465	(149,844,852)	158,557,317	(130,110,776)	1,381,377,718

The explanatory notes are an integral part of the financial statements

Explanatory Notes to the Financial Statements of 31 December 1988 and 1987

NOTE 1. - Activities: On 31 August 1988, Decree-Law No 2,464 ordered a change in Brazilian nuclear policy. Among the measures enacted thereby was a change in the name of the company to Nuclear Industries of Brasil S.A. (INB) and a reformulation of its statement of corporate purpose. Therefore, INB is a mixed-economy company set up as an implementing agency of the federal government's monopoly in the nuclear sector (Article 5 of the company by-laws) and having the following objectives: I

- Prospecting and mining deposits of nuclear and associated ores; II - Building and operating: (a) facilities to treat, concentrate, and convert nuclear ores and their associates and by-products; (b) facilities to be used for uranium enrichment and the reprocessing of irradiated fuel elements as well as production of fuel elements and other materials of interest to the nuclear industry; III - Buy and sell equipment, materials and services of interest to the company on the domestic and foreign markets; IV - Market the nuclear materials that are included within the scope of the federal government's monopoly. During the first 8 months of this fiscal year, the company maintained its operating activities at only a minimum level, both because of the shortage of available financial resources and because of the reappraisal of the Brazilian nuclear program which had begun in August 1986 on the basis of Statement of Justification No. 009/86, approved by the president of Brazil. During the last 4 months of the year, the company carried out an institutional and administrative restructuring in order to adjust to the new nuclear policy instituted on 31 August 1988 by Decree-Law No 2,464 and Decrees Nos 96,621; 96,622; and 96,623.

NOTE 2. - Pertinent facts: Decree-Law No 2,464 introduced significant changes in company activities, specifically: (a) The task of building and operating nuclear power plants was transferred to Electrobras and the public utilities in the electric power sector; (b) The federal government transferred the stock it owned in INB to the CNEN; (c) The federal government received, by dation in payment of its credits with INB and without appraisal, the shares of NUCLEN stock that INB owned, the property that constituted the assets of the CDTN, the CTAS, and the nuclear electric power plants Angra II and Angra III; (d) INB's debts to the federal government as of the date of publication of the decree-law were cancelled; (e) The federal government succeeded INB and its subsidiaries in the rights and obligations resulting from internal and external credit transactions consummated on or before the date of publication of the decree-law, as well as in other monetary obligations existing on that same date, except for those of a labor law and social security nature. The net result of the absorption of the liabilities of INB and its subsidiaries, and of the assets of the INB, in the amount of Cz208,191,003,000 is presented in the net worth, in the specific absorption reserve account, as shown in the following table:

Accounts	INB	NUCLEP	NUCLEMON	NUCLEI	NUCLAM	Totals
Financing to FURNAS	1,270,156,511	0	0	0	0	1,270,156,511
Current accounts	84,689,145	(3,944,945)	(108,682)	(81,504,938)	(980,195)	(1,849,615)
Fixed assets	3,610,731	0	0	0	0	3,610,731
Loans and financing	(1,298,398,124)	(8,105,696)	0	(25,384,109)	(1,162,854)	1,333,050,783
Suppliers	(65,469,579)	(652,800)	(113,947)	(351,623)	0	66,587,949)
Taxes and fees	(26,484,037)	(13,131)	(752)	0	(26,556,994)	
Advance for future increases in capital	(45,840,807)	0	0	0	(70,410)	(45,911,217)
Other accounts	(7,911,711)	(6,529)	(3,323)	(80,064)	0	(8,001,687)
Grand totals	(85,647,931)	(12,723,101)	(285,026)	(107,321,486)	(2,213,459)	(208,191,003)

(f) As a result of the dation of the assets of which INB was the sole owner in payment of the debts of INB and companies it controls, the INB subrogated itself in the credits with those companies. As a consequence of this subrogation, credits receivable accounts were set up in INB in the exact amount of the liabilities that were absorbed by the federal government. These accounts were monetarily indexed according to the change in the value of the National Treasury Bonds (OTN) as of the date of the balance sheet; (g) Decree No 96,621 of 31 August 1988 included the subsidiaries NUCLEI and NUCLAM in the Federal Denationalization Program for dissolution and ordered that the rights of the minority shareholders in those companies be guaranteed by INB; (h) Decree No 96,623, also of 31 August 1988, included the subsidiaries NUCLEP and NUCLEMON under the Federal Denationalization Program for privatization and provided that the INB will guarantee the rights of the minority shareholders; (l) Authorized by Decree No 96,662, also of 31 August 1988, the INB on 4 October 1988 established a subsidiary, in the form of a mixed-economy company, to be known as Uranium of Brasil S.A., with headquarters and legal domicile in the city of Caldas, Minas Gerais State. Its purpose is exploration, prospecting, and mining of nuclear and associated ores, as well as production and processing of nuclear ore concentrates; (j) Because of the urgent need to sustain the operations of INB and its subsidiaries, these companies have honored part of the payments for which the federal government was liable as a result of the absorption arranged under Decree-Law No. 2,464 of 31 August, 1988. So the INB set a credit receivable account for the federal government in the amount of the disbursements it had made and each of them was monetarily indexed in accordance with the change in the value of the National Treasury Bonds (OTN) for the period between the date of disbursement and the date of the balance sheet according to a formula approved at the 278th meeting of the executive directors of INB on 2 June 1987. Brief accounts of the effects of the legal measures summarized above are contained in each of the following explanatory notes, when appropriate.

NOTE 3 - Financial statement format: (a) Financial statements according to company legislation were prepared in accordance with the Corporation Law and the complementary measures enacted by the Securities

Commission (CVM) and in observance of the accounting practices described in Note 4. The effects of inflation are acknowledged by means of monetary indexation of the fixed assets and the net worth, and by updating the monetary value of the other assets and liabilities that are subject to indexation; these effects are reflected in the earnings for the year. (b) Financial statements prepared using full indexation: In observance of the provisions of CVM Instruction No 64, the company has begun presenting complementary financial statements that have been adjusted for the effects of inflation. These are entitled "By Full Indexation." Pursuant to that instruction, the monetary updating was done on the basis of the changes from month to month in the value of the National Treasury Bonds (OTN). The following are the criteria adopted to prepare these financial statements: Index of Correction: The updating of the monetary values was done on the basis of the changes from month to month in the value of the OTN. Net Worth: The fixed assets and the net worth have been updated through December 1988; the other components were maintained at their original figures because this is in accordance with the December 1988 purchasing power of the currency, except inventories, which were not monetarily updated in view of the insignificance of the sums involved. That is why the assets and liabilities figures on 31 December 1988 arrived at "according to company legislation" are the same as those obtained "by full indexation." Complementary Income Statement: The components of the income statement are updated monetarily beginning with the month of their formation (entry onto the books) on the basis of the changes from month to month in the value of the OTN and adjusted and complemented in terms of the following aspects:

- The effects of inflation on the inventories, calculated at the beginning of each month on the basis of the change of the OTN are included in the cost of products sold.
- The charges for depreciation and amortization are determined and recorded in auxiliary ledgers in OTN, and converted to cruzados using the OTN value on the date the books are closed for the year.
- The losses and gains due to inflation, calculated monthly on the basis of the change in the OTN with reference to the monetary liabilities and assets, that generate nominal expenses and receipts, are considered as reduction factors of the respective components of the income statement.
- The losses and gains due to inflation, calculated monthly on the basis of the change in the OTN with reference to the other monetary items, are considered in a specific account of the operating income under the heading of "losses on the nonremunerated monetary items."

Statement of Shareholders' Equity and Statement of Changes in Financial Position figures in these financial statements are presented in December 1988 currency.

NOTE 4 - Principal accounting practices: (a) The income for the year was determined on an accrual basis (income and costs are recorded in the year incurred, even if received and paid in other years); (b) Assets receivable and liabilities payable within 360 days are classified as "current"; (c) Investments resulting from equity interest in controlled companies are appraised by the equity accounting method, and the others are recorded at their corrected cost; (d) Plant and equipment are recorded at the corrected acquisition or construction cost. Depreciation is calculated by the linear method, by applying rates that take into account the economically useful life of the items, i.e.: buildings, 25 years; machinery and equipment, 10 years; furniture and tools, 10 years; vehicles, 5 years; (e) Deferred assets are presented at the cost, plus monetary indexation, and are being amortized by the linear method in 5 years.

NOTE 5 - Loans and financing (assets): The figure for loans and other financing, most of which were made to the controlled firm NUCLEI, in the amount of Cz2,263,996,000, represents the balance of commercial transactions governed by the loan agreement, with long-term, open, due dates. The balance on the financing granted to Furnas Electric Power Stations S.A. which, on 31 August 1988, represented the invoices issued by Nuclebras, the former name of Brazilian Nuclear Industries S.A.-INB for the account of the construction of the Angra II and Angra III nuclear power plants, plus contractual financial charges, as well as the balance on the construction services performed but not billed because the contractual event did not occur, were absorbed by the federal government under the provisions of Article 5 of Decree-Law No 2,464 of 31 August 1988. It was also under that decree-law that the 31 August 1988 balance on the financing granted to the controlled companies was absorbed by the federal government. Starting on 1 September 1988, the loan agreement signed between the INB and the companies it controls, except for NUCLEI, was considered as having been rescinded.

NOTE 6 - Investments in thousands of cruzados:

	On 31 Dec 88	On 31 Dec 87
Interest in controlled companies:	51,868,676	2,991,206
—NUCLEI	24,465,251	2,670,711
—NUCLEP	0	15,867
—NUCLEN	0	68,027
—NUCLAM	0	0
—NUCLEMON	9,485,934	236,601
—Uranium of Brazil	17,917,491	0
Land	6,493,531	132,654
Others	569,964	14,799
	58,932,171	3,138,659

The shares of stock in NUCLEN owned by INB were given, on 12 September 88, in payment of the INB's debts to the federal government.

Additional Information on Investments in Controlled and Affiliated Companies - Values and Quantities in Thousands

	NUCLEP	NUCLEI	NUCLAM	NUCLEMON	URANIUM	NUSTEP
Capital subscribed and paid up	10,500,000	32,620,336	4,526,143	5,633,084	12,499,980	55,318
Number of shares or quotas	10,500,000,000	2,670,710	251,985	5,633,084	12,499	6,260
Type of stock	Regist'd common	Regist'd common	Regist'd common	Quotas	Regist'd common	Quotas
Net worth of controlled companies	(18,974,904)	32,620,336	(1,830,361)	9,485,934	17,917,491	32,976
Base date	31 Dec 88	31 Dec 88	31 Dec 88	31 Dec 88	31 Dec 88	30 Sep 88
Percent of equity interest	100	75	51	100	100	50
Adjustment by equity accounting	(148,008)	0	0	382,032	2,270,694	0
Profit (loss) for the year	(19,122,918)	0	0	381,710	(2,270,694)	22,342
Loans and financing granted	0	2,263,996	0	0	0	0
Special credit from INB	30,378,295	259,204,670	5,348,918	314,532	0	0
Advances for capital increase	61,702,995	0	0	241,797	1,486,224	127,237
Accounts payable	0	0	0	0	0	0
Receipts	37,555,331	0	3,892,372	544,987	147,273	117,381
Expenses	67,305	0	0	9,959	0	0

Remarks: (1) The financial statements for the controlled companies were examined by independent auditors. (2) The figures for receivables and payables represent cash flow generation, furnishing of goods and services, and reimbursable expense transactions.

NOTE 7 - Plant and equipment - in thousands of cruzados:

	On 31 Dec 88			On 31 Dec 87
	Corrected cost	Corrected depreciation and amortization	Net	Net
Land	1,213,344Tc0	1,213,344	348,569	
Buildings	4,327,206	1,127,027	3,200,179	1,870,521
Machinery and equipment	9,928,233	3,301,216	6,627,007	3,130,524
Vehicles	201,804	189,889	11,915	9,719
Furniture and tools	1,376,407	1,117,587	258,820	79,966
Improvements to third-party property	575,066	484,600	90,466	85,291
	17,622,050	6,220,319	11,401,731	5,524,590
Imports in progress	989	0	989	2,025
Construction in progress	2,793,127	0	2,793,127	2,951,755
Other plant & equipment	20,721	0	20,721	4,286
	20,436,887	6,220,319	14,216,568	8,482,656

The depreciation for the year was distributed as shown in the following table, in thousands of cruzados:

Absorbed into the cost of production and services	380,229
Operating expenses	1,154,584
—Administrative expenses	533,957
—Applied to technological R & D	88,880
—Costs not applied to production	531,747
Total of depreciation	1,534,813

The assets of the CTAS, the CDTN, and the Angra II and Angra III nuclear power plants were given in payment of the debts owed by Nuclebras to the federal government pursuant to sections II and II of Article 3 of Decree-Law No 2,464 in the amounts indicated in the following table, in thousands of cruzados:

CTAS	809,995
CDTN	2,018,650
Angra II and III	770,472
	3,599,117

On 4 October, 1988, INB created the subsidiary known as Uranium of Brasil S.A. with capital of Cz12,500,000,000, of which 12,499,980,000 belong to INB. Of the total contribution of capital by INB, Cz149,980,000 was paid in cash, Cz1,138,163,000 in the form of inventories, and the remaining Cz11,211,837,000 in the form of INB property relating

to the activities of the Pocos de Caldas Industrial Complex, appraised by experts, as shown in the following table:

	INB Plant and Equipment				
	Corrected cost	Corrected depreciation and amortization	Net	Appraisal report	Gain (loss) in appraisal
Land	212,134	0	212,134	267,058	54,924
Construction	10,214,939	2,543,499	7,671,440	5,149,137	(2,522,303)
Machinery and equipment	22,261,220	13,890,955	8,370,265	5,716,346	(2,653,919)
Furniture and tools	282,921	197,701	85,220	59,218	(26,002)
Vehicles	179,985	151,447	28,538	20,076	(8,462)
Mineral deposits	0	0	0	2	2
Totals	33,151,199	16,783,602	16,367,597	11,211,837	(5,155,760)

NOTE 8 - Deferred assets, in thousands of cruzados:

	On 31 Dec 88			On 31 Dec 87
	Corrected cost	Corrected depreciation and amortization	Net	Net
Expenses for uranium exploration and prospecting program	0	0	0	1,682,369
Expenses for Pocos de Caldas project	0	0	0	1,734,489
Expenses for technical data, consulting, training	11,235,433	1,870,918	9,364,515	2,819,631
Interest on loans and financing	14,331,326	1,328,430	13,002,896	9,428,809
Other expenses (net of receipts) to be amortized	0	0	0	372,264
	25,566,759	3,199,348	22,367,411	16,037,562

On 1 September 1988, a write-off from deferred assets was taken for expenses incurred for projects and activities that were no longer part of the stated company purposes of INB after the reformulation of the Brazilian nuclear program accomplished under Decree-Law No 2,464 of 31 August 1988. In addition, deferred assets related to the Pocos de Caldas Industrial Complex (CIPC) were also written off because of the creation on 4 October 1988 of the subsidiary Uranium of Brazil S.A., as were deferred assets relating to the discontinued activities. Details on the amounts written off appear in the following table, in thousands of cruzados:

	Portion	Total
Pocos de Caldas Industrial Complex		
—Removal of burden		10,862,705
Conversion		5,538,792
—Administration	759,575	
—Product development	980,301	
—Financial expenses	3,798,916	
Reprocessing		37,971,009
—Administration	2,352,516	
—Product development	2,510,727	
—Financial expenses	33,107,766	
Technology preservation program		1,726,733
—Engineering	378,660	
—Consulting services	592,085	
—Equipment	162,559	
—Services	546,656	
—Others	46,763	
Exploration and prospecting		9,542,370
NUCLEI - Product development		114,883
Itataia - preoperational expenses		701,822
Lagoa Real - preoperational expenses		263,404
Rio Cristalino - preoperational expenses		257,811
		66,979,519

NOTE 9 - Loans and financing (liabilities): The bulk of the loans and financing in foreign currency were guaranteed by the Federative Republic of Brazil. Foreign loans taken in U.S. dollars, in German marks, in French francs and in Swiss francs had due dates as late as the year

2003, and were subject to charges that ranged from 5.62 percent to 12.5 percent per annum. The loans in domestic currency were subject to monetary indexation and to charges that ranged from 7.44 percent to 23.7 percent per annum. On 1 September 1988, the entire amount of loans and financing obtained by Nuclebras was absorbed by the federal government in accordance with the provision in Article 5 of Decree-law No 2,464. The following table shows the sums absorbed by the federal government, in thousands of cruzados:

Financing in Brazil	601,419,248
—Short-term	595,782,760
—Long-term	5,636,488
Financing outside Brazil	696,978,877
—Short-term	100,583,186
—Long-term	596,395,691
	1,298,398,125

NOTE 10 - Capital and reserves: The subscribed and paid-up capital is represented by 140,093,840 shares of common stock and 93,395,892 shares of preferred stock, having a value of Cz201.74 per share. Capital reserves constituted in 1982 or earlier are, almost entirely, made up of subsidies from the sole tax on liquid and gaseous lubricants and from agreements for investment in research and development of ores and nuclear technology, and in the installation of units of the nuclear fuel cycle. In contrast, the capital reserves constituted in 1988 result from the absorption by the federal government of the internal and external lines of credit and other monetary obligations—except for labor law and social security charges—incurred by the INB and its subsidiaries, after deducting the fixed assets of the INB that were given in payment of the credits, as provided in Decree-Law No 2,464 of 31 August 1989.

NOTE 11 - Financial receipts and expenses, in thousands of cruzados:

	Full indexation In 1988	Company legislation In 1988	Company legislation In 1987
Receipts			
Monetary changes	0	1,107,898,052	240,719,873
Interest, commissions, fees	(334,587,460)	156,313,268	28,918,965
	(334,587,460)	1,264,211,320	269,638,838
Expenses			
Monetary changes	0	940,048,630	249,983,465
Interest, commissions, fees	(386,724,917)	118,558,679	28,911,357
	(386,724,917)	1,058,607,309	278,894,822

The monetary changes in the financing obtained and invested in fixed assets, in the amount of Cz6,834,478,000, were separated from these financial income items and are presented after the income from the monetary indexation of the balance sheet.

NOTE 12 - Gains on the monetary items, in thousands of cruzados:

Cash on hand and in banks	1,848,372
Nonremunerated accounts receivable	2,929,987
Blocked accounts	246,127
Expenses for subsequent years	2,618,975
Others (assets)	21,906,696
Suppliers in Brazil	(24,656,273)
Social security and tax obligations	(92,287,647)
Income from the following year	(5,515,619)
Others (liabilities)	(12,494,095)
Other accounts (net)	1,113,793
TOTAL	(104,289,684)

NOTE 13 - Remuneration of officers and employees: The sum of the payments made to the officers (board of directors, audit committee, executive directors) in 1988 and included as administrative expenses in the income statement was Cz106,733,000 (Cz13,662,000 in 1987). The highest and lowest remuneration received by any officer or employee in December 1988 was Cz4,250,000 (Cz276,000 in 1987) and Cz82,000 (Cz9,000 in 1987), respectively.

Respectfully submitted, John Milne Albuquerque Forman, chairman of the Board, Sergio Eyer Joras, director of operations, Joao Batista de Mello, comptroller.

Opinion of the Audit Committee

The Audit Committee of Brazilian Nuclear Industries, S.A. (INB), pursuant to the legislation now in force and the provisions of the company by-laws, has examined the report by the company officers on the activities of the company, as well as the financial statements of INB, which consist of the balance sheet, the income statement, the statement of shareholders' equity, the statement of changes in financial position, the explanatory notes, and the opinion of the independent auditors of Boucinhas, Campos & Claro S/C concerning the year ended 31 December 1988. Based on its analysis, the audit committee is of the opinion that the documents examined adequately portray the net worth and financial situation of INB, and recommends that the general assembly of stockholders give them its full approval. Brasilia, 28 June 1989. Jose Flavio Junqueira Enout, chairman of the Committee, Ivan Pedro Salati de Almeida and Xisto Vieira Filho, members of the Committee.

CHILE

Nuclear Commission Denies Building Plant

PY2608015989 Santiago Domestic Service in Spanish 2300 GMT 24 Aug 89

[Text] The National Commission for Nuclear Energy [CNEN] has clarified a mistaken newspaper report which alleged that Chile is building a nuclear power plant in Chile and a nuclear waste dump in Argentina.

CNEN Executive Director Hernan Brady released a note in which he categorically denied the construction of such a plant. In a news conference on 14 August, the CNEN merely evaluated the different energy alternatives available in the country and one of the alternatives is a nuclear plant, Brady said.

Another noteworthy point is that in today's technology the electric energy produced by a nuclear plant is more expensive than that produced by an hydroelectric plant. The note adds that in no case could a nuclear plant cost $1 billion, as a Santiago newspaper hs reported.

The communique concludes by saying that Argentine authorities are analyzing some 200 possible sites for establishing a nuclear waste dump.

PERU

Nuclear Center Dedicates New Laboratory

PY2508214789 Lima EL COMERCIO in Spanish 21 Aug 89 p A-3

[Excerpt] Research reactor RP-10 at the "Oscar Miro Quesada de la Guerra" nuclear center has been put to a new scientific application: a "neutrography laboratory" ["laboratorio de neutrografia"] that has just been dedicated at the cost of $40,000.

It was dedicated by CONCYTEC [National Science and Technology Council] President Carlos del Rio Cabrera. This institution had strongly supported the project, which was proposed by experts from the Peruvian Nuclear Energy Institute (IPEN) with the cooperation of the Science College of the National Engineering University.

The equipment was obtained under a Peruvian-Argentine agreement. [passage omitted]

EGYPT

Agreements Signed to Develop Domestic Uranium

51004607z Cairo AL-JUMHURIYAH in Arabic 2 Aug 89 p 6

[Report by Faruq 'Abd-al-'Aziz]

[Text] The Nuclear Materials Authority has begun to develop uranium ore in recently discovered areas and determine future quantities for mining and use. This comes after the discovery of ore in the areas of Jabal Qatar, (al-Mustat), al-'Aridah, and Um Qar in the Eastern Desert.

Dr Husayn 'Abd-al-Muhsin, chairman of the authority, said that operations to develop uranium ore require digging tunnels to trace the ore veins in the rock.

The Ministry of Electricity has signed several technical cooperation agreements with Australia, Canada, and Niger for advanced technology transfer in the fields of mining and uranium ore development, with the intention of providing the nuclear fuels needed for the Egyptian nuclear power-generating program, should the government agree to it.

INDIA

Two Large Reactors To Be Built With Soviet Aid

51500170 Madras THE HINDU in English 8 Jul 89 p 11

[Text] Hyderabad, July 7—Two large nuclear reactors of 1,000 MWe capacity are to be built in the 90s with Soviet collaboration to supplement the national programme to establish 10,000 MWe of nuclear power by the turn of the century.

This was announced by Dr. M.R. Srinivasan, Chairman, Atomic Energy Commission (AEC), and Secretary, Department of Atomic Energy (DAE), in the course of the Nayudamma memorial lecture here on Friday.

Speaking on "Nuclear power—technological and managerial challenges," Dr. Srinivasan said a dozen reactors of 235 MWe capacity and six of 500 MWe capacity based on the heavy water-cum-natural uranium technology were being constructed. The first in the series, Narora-1, which attained criticality in March last, was scheduled to be synchronised with the grid later this month. In addition, six more reactors of 500 MWe capacity would be taken up for completion by 2000 AD.

Power stations doing well: The forerunner to the programme was the Madras Atomic Power Station (MAPS) at Kalpakkam, the first fully indigenous nuclear power station in the country, which had performed satisfactorily.

The first nuclear power station at Tarapur was doing well, producing non-hydro power at the lowest cost and was expected to operate well beyond 1993, the projected economic lifespan. The station in Rajasthan was also operating well.

The objective of self-reliance in nuclear power was being fully achieved in the sense that by 2000 AD, 26 of the 32 reactors then in operation would be based on indigenous design and technology. The import component of nuclear stations was about 10 per cent compared to 30 to 35 per cent, say, for fertilizer plants.

The present uranium resources were estimated to support the generation of 10,000 to 15,000 MWe. More resources could be found. Even available resources could support the generation of 3.5 lakh MWe when the fast breeders were utilised.

Dr. Srinivasan paid tributes to Nayudamma, leather technologist and former Director-General of Council of Scientific and Industrial Research (CSIR).

Fears on plants allayed: Dr. Srinivasan, seeking to clear the misconceptions and allay fears of anti-nuclear activists regarding safety of nuclear plants, said the Soviet Union, despite the Chernobyl accident in 1986, was not giving up nuclear power development. Even Japan, which faced an atomic holocaust, was fully committed to nuclear power programme.

When he visited Chernobyl a few months ago he found that except for a 30-km region around the plant, agricultural and livestock rearing activity in the area had come back to normality. Three of the four units, including the one affected, were back in action.

Spokesman on Super Computer, Nuclear Material

BK2308163189 Delhi ISI Diplomatic Information Service in English 1430 GMT 23 Aug 89

[Excerpts] In reply to a question regarding some Western press reports about Pentagon raising objections to supply of second Cray super computer to India, a spokesman said that we have a long standing request for import of a super computer for the Indian Institute of Science in Bangalore. We understand that interagency process for consideration of our application within the United States Government is under way. The Government of India has no comments to offer on internal discussions of the U.S. Government. [passage omitted]

In reply to a question about India obtaining some nuclear material from West Germany, the spokesman said that India has imported some cadmium bearing stainless steel tubes from NTG [Neue Technologien Gmbh] following open tender and competitive bidding procedure. This material cannot be termed as nuclear material.

Center Develops Uranium-233 for Research Reactor

BK2708091689 Delhi Domestic Service in English 0730 GMT 27 Aug 89

[Text] The radio-metallurgy division of the Bhabha Atomic Research Center has successfully fabricated Uranium-233 as fuel sub-assembly for the research reactor Kamini. The head of the radio-metallurgy division, Dr Ganguly, told PTI [PRESS TRUST OF INDIA] that Kamini is the first reactor of this kind in the world to use U-233-bearing fuel.

PAKISTAN

Bhutto Reiterates Nonproliferation Commitment

Interviewed by AFP

BK2908161089 Islamabad Domestic Service in Urdu 1500 GMT 29 Aug 89

[Text] Prime Minister Ms Benazir Bhutto has reiterated her government's firm commitment to nuclear nonproliferation and said any kind of unilateral step by any country in the subcontinent may trigger an arms race. In an interview with AFP, she clarified Pakistan's peaceful atomic policy. The prime minister made the reminder that Pakistan has initiated steps for a regional-level discussion on this issue. She emphatically said that only this kind of discussion will provide a guarantee preventing the threat of a proliferation of nuclear arms in the subcontinent.

Further on Bhutto Interview

BK2908143689 Hong Kong AFP in English 1417 GMT 29 Aug 89

[By Rene Slama]

[Excerpt] [Passage omitted] Ms Bhutto said Islamabad had begun steps to open a "regional discussion" on nuclear disarmament, but noted that India, with whom Pakistan has fought three wars since independence in 1947, "has some hesitations on this point."

She said such discussions were "the sure way to guarantee an end to the threat of nuclear proliferation" on the subcontinent.

"We feel that any one-sided action by any country in the subcontinent can trigger off a nuclear arms race," said Ms Bhutto.

India exploded what it called a peaceful nuclear device in 1974, in northwestern Rajasthan State on the Pakistan border. It has repeatedly said that it is not engaged in manufacturing a nuclear weapon but would review its options if Pakistan produced one.

India, like Pakistan, is not a signatory to the nuclear non-proliferation treaty.

Bhutto Claims Nuclear 'Knowledge' Available

BK2908112189 Hong Kong AFP in English 1108 GMT 29 Aug 89

[Text] Islamabad, Aug 29 (AFP)—Prime Minister Benazir Bhutto said Tuesday [29 August] Pakistan had sufficient nuclear "knowledge" to deal with any threat, but that it had no intention of using that knowledge.

"We do have the knowledge but I think there is a difference between knowledge and capability," Ms Bhutto said in an interview with AGENCE FRANCE-PRESSE.

"So we do have a knowledge, if confronted with a threat, to use," she went on.

"But we do not in the absence of any threat intend to use that knowledge," she said.

"In fact, as matter of policy my government is firmly committed to (nuclear) non-proliferation," the prime minister said.

She added that "any one-sided action by any country in the subcontinent can trigger off a nuclear arms race."

Ms Bhutto stressed that Islamabad had begun steps to open a "regional discussion" on the issue, but noted that India, with whom Pakistan has fought three wars since independence in 1947, "has some hesitations on this point."

She said such discussions were "the sure way to guarantee an end to the threat of nuclear proliferation" on the subcontinent.

Pakistan has been accused in the past of building an atomic bomb, but has always denied the allegations.

General Supports Nuclear Weapons Development

BK2908064989 Lahore JANG in Urdu 10 Aug 89 p 3

[Editorial: "A Suggestion That Deserves Attention"]

[Text] Retired General K.M. Arif, the former vice chief of the Army Staff, has said that national interests demand the development of a nuclear program on the highest priority basis and its logical corollary—the production of nuclear weapons. Addressing a seminar on the regional environment and the defense of Pakistan on 8 August, Gen Arif stressed that India fosters a strong urge to become a superpower in the future, and all its diplomatic and military efforts are devoted to accomplish this objective. He said that India has the fourth largest army, fifth biggest navy and the sixth biggest air force of the world. India's defense budget has soared to 153.74 billion [denomination not given]. It has made major strides in computer and nuclear technology and carried out successful tests of a number of missiles of various types. It has nuclear submarines and also six squadrons

of aircraft which are capable of carrying nuclear warheads. India's attitude toward its neighbors is extremely aggressive. Furthermore, India considers Pakistan as her number one enemy. On the other hand, Pakistan has only one port and is entirely dependent on it for all its needs.

In view of these facts, Gen Arif advised us to judiciously utilize our resources and to give special importance to effective defense measures. We should also give a serious thought to the promotion of national unity and integrity in order to face the external aggression, he suggested. Pakistan can play an effective role in ensuring regional and global peace only when it has security, internal stability and a strong defense system. As a professional army man with a long career and deep experience at the senior level in the Pakistani Army, Gen Arif has keen insight into defense matters, and his analysis of Pakistan's defense requirements is based on solid and irrefutable facts. After all, it is the opinion of a professional army man and an experienced general, so this view cannot be termed the mere product of political or emotional perspective.

Despite our firm commitment to check nuclear proliferation and prevent the military use of nuclear technology, it will never be wise to ignore the activities of countries, which are obviously hostile to us, and the increasing threats to Pakistan. The whole world knows that India is not willing to abandon its nuclear ambitions and it is insisting that the issue should be viewed in a global and greater regional perspective. If this is so, then it should be fair and justifiable on the same grounds for Pakistan to develop nuclear technology. If an aggressive country in our neighborhood, like India, is stockpiling atom bombs, missiles, submarines and other deadly weapons, then why should we hesitate to take the necessary steps for our defense and security? Almost all the responsible quarters are unanimous on Pakistan's nuclear program. They observe that while primarily opposing the use of nuclear technology for military purposes and continuing our sincere efforts to prevent the world from being threatened by a nuclear disaster, we should simultaneously keep a vigilant eye on the production of destructive nuclear weapons which can be used any time against us. As any other responsible and realistic Pakistani, Gen Arif has stated in categorical terms that India maintains an earnest desire to become a super power and is striving to establish its hegemony on the entire region, including the Indian Ocean. India is not willing to pay heed to anyone in the world when it comes to the question of its nuclear or military preparations. Moreover, India's attitude toward its neighbors is not so friendly that one can remain complacent and refrain from expressing concern. Pakistan, and all of India's other neighbors, at one stage or another, have been the victims of its aggression. Indian maneuvers are still continuing to make her neighbors as obedient puppets. Indian policy planners consider Pakistan as the biggest hurdle on its way, and as Gen Arif categorically said: India considers Pakistan as its number one enemy.

If we adopt an apologetic attitude on every issue and ignore the tremendous threat being faced by the country's defense, despite having been aware of such solid and evident facts and despite repeatedly being the victim of Indian aggression, and allow ourselves to be overwhelmed by hollow words of peace and friendship by Indian rulers, or if we remain fearful of a hypothetical worldwide condemnation, then we will obviously be doing nothing but pushing ourselves to the pit of destruction. What is needed in the given situation is that the whole nation should be kept ready to the fullest extent for the country's defense. An atmosphere of national unity and unanimity should be created at every level. Political differences should never be allowed at any stage to prevail over national interests. And a realistic approach with full determination and confidence should be adopted in case of defense preparations by abandoning the apologetic attitude. Primary efforts should be made to meet the country's defense and security requirements in accordance with the suggestions given by Gen Arif and other defense experts. It is tantamount to nothing but national suicide to expect peace and security from India after it becomes a formidable nuclear power—the India which did not hesitate to dismember our country even when it did not have nuclear capability.

Commentary Takes Issue With Pro-Bomb Lobby

51004710 Islamabad THE MUSLIM in English 19 Aug 89 p 4

[Article by Syed Rifaat Hussain: "Problems of Nuclear Thinking in Pakistan"]

[Text] Ever since lat Zulfiqar Ali Bhutto's stoic riposte to the Indian atomic explosion of 1974 that Pakistanis would "eat grass" but acquire atomic capability, Pakistan's nuclear programme has been a recurrent theme in international discussions on nuclear proliferation. Fed by fantastic stories of the so-called "Islamic bomb," these discussions have tended to revolve round an apocalyptic scenario of a fatal "fourth round" between India and Pakistan. It is thus argued that since relations between India and Pakistan have been such a "minefield of mutual recriminations communal antagonisms, and military confrontation," a "final" round is bound to erupt should "diplomacy and conciliation fail."

In marked contrast to this incredibly alarmist international thinking, domestic public debate has tended to view the Pakistani nuclear programme with a sense of tremendous equanimity, and the possession of the bomb as an 'ultimate good.' No less a person than General (Retd) K. M. Arif, the former vice chief of the army staff under Zia, has thus very recently recommended that "Pakistan's national interest demands that her nuclear programme be expanded and taken to its logical conclusions to produce the ultimate weapon."

Deterrent

Notwithstanding obvious problems with the timing of Mr Arif's unsolicited and unofficial advice, is an undeniable fact that nuclear weapons can act and have acted as a deterrent against external aggression. There is also

no gainsaying the fact that Pakistan's nuclear programme, while peaceful, remains in our supreme national interest. Yet, the pro-bomb lobby in Pakistan—a motley crowd of self-proclaimed defence strategists, unreflecting politicians and publicists—has failed to make a convincing case in terms of a logical and rational connection between Pakistan's national security and the coveted bomb. More specifically, it has failed to fully come to grips with the central issue of how to ensure the stability of Indo-Pakistan nuclear balance once the two countries cross the nuclear threshold. Pakistan's quest for the nuclear status has been generally defended on three counts.

First, there is the sovereign rights argument. According to this view, like all other countries, Pakistan has an inalienable right to those public goods such as national defence which are vital to the survival of the sovereign state. Since nuclear weapons are deemed essential to Pakistan's national security, it is suggested that we acquire them in earnest. The problem with this argument is that, besides being vague, it is tautological. Instead of establishing grounds for a clear and well thought-out linkage between nuclear weapons and security, it assumes that such a link already exists. Therefore, like all self-evident truths, it can not be subjected to rational discourse, nor can it be empirically refuted. Further, it assumes that Pakistan's national security is a given which is already and best known to the ruling elite. We know it too well that this has hardly ever been the case. For example, did Zia regime's activist Afghan policy contribute to Pakistan's national security? Evidently it has not, when one takes into account the myriad of socio-economic, ethno-political conflicts spawned by it due to the presence of Afghan refugees. National security like Islam is too contested and broad a term to be useful unless it is operationalised.

The second and much more seductive argument of the pro-bomb lobby is the "bang-for-bang" thesis. As Brigadier (Retd) A. R. Siddiqi puts it approvingly, "What India could do, Pakistan can and must do, regardless of any pressures." The obvious flaw is this argument is that it is unnecessarily Indo-centric, and by virtue of this fixation, insensitive to other dimensions of Pakistan's defence and strategic needs, for instance, of our relations with the superpowers. Worse still, it make Pakistan's defence outlook appear as nothing more than a reflexive aping of Indian actions and orientation in the defence arena. India and Pakistan remain, and would perhaps always be, strategic competitors by dint of their geostrategic compulsions, but that is hardly a good enough reason for us to become geographically myopic. It is high time we come of age by overcoming our India-complexes, whether nuclear or otherwise.

Substitute

The third and much more convincing argument for Pakistan's nuclear bomb relates to the economics of defence. This view holds that Pakistan's nuclear forces can act as a potential substitute for increasingly expensive conventional military power. Given Pakistan's current economic difficulties, nuclear weapons can buy defence cheap and perhaps better, especially when it comes to dealing with an enemy like India that enjoys an almost one to three advantage in force-ratios. The problem with this line of nuclear thinking, however, is that it makes the occurrence of nuclear war almost a foregone conclusion once we accept the premise of the essential inter-changeability of nuclear and conventional weapons. A country will have no option but to rely on the use of nuclear weapons the movement it becomes clear that its conventional forces are either too weak or no longer adequate to confront the enemy in a situation of limited military engagement.

Further, this line of argument blurs the crucial distinction between conventional and nuclear weapons: the latter are not fighting weapons they are weapons of deterrence par excellence. But their function as deterrents takes place under a highly-specified set of conditions. This brings us to the discussion on the deceptively simple concept of deterrence. For an effective deterrence, two requirements must hold: the capability to inflict unacceptable damage and the manifest credibility of the threat.

In other words, military capabilities must be sufficient, been under the most adverse conditions of their having been struck first, to threaten to inflict unacceptable costs on an enemy. Such a threat must also have sufficient credibility; its execution must appear probable enough to make the risk of attacking it unacceptable. Most deterrence theorists assume that if the potential costs of war are extremely high, and the probability of having to pay those costs is also high (or, in traditional terms, the probability of victory is low), then deterrence ought to be secure. Yet, as recent studies show, these well-known requirements are not sufficient for deterrence to "work".

A host of other and equally important political and psychological conditions have to prevail in the decision-making process on both sides if deterrence is to function as envisaged. These include the following: "leaders capable of relatively unbiased assessments of information and realistic linkage of action t consequences; political systems permitting the implementation of rational decisions as policy; leaders who are well-informed and comprehend the intentions, interests, commitments and values of the opponents; leaders who focus on external factors (i.e., competing military capabilities) as the final determinant of decisions; and leaders who understand the military capabilities and consequences involved in their decisions."

How far, if at all, these important military, psychological and political variables can be brought into play in the proposed India-Pakistan nuclear equation is the million dollar question that the pro-bomb lobby in Pakistan has conveniently chosen to ignore. Will somebody answer it for the sake of posterity?

New Book Details Nuclear Program Politics

46560057z Islamabad HURMAT in Urdu
27 Jun-3 Jul 89 pp 7-13

[Excerpts from "Dr Abdul Qadeer Khan and the Islamic Bomb" by Zahid Malik: "The Unforgettable Dr Abdul Qadeer Khan; Who Leads the Anti-Kahuta Lobby?"]

[Text] Pakistan's acquisition of atomic technology and its use is considered a miracle in the the Third World countries and this development has amazed the superpowers. Those holding monopoly over the atomic technology could not even imagine a few years ago that a backward country could find a perfect method for enriching uranium which they were looking for badly. Atomic scientists know that enriching uranium is a very complex and difficult operation. That fact that industrialized countries have not made any significant progress in this area clearly shows how difficult this process is.

Pakistan's program for peaceful use of atomic energy is still in progress despite the strong propaganda carried out against it by India, United States of America, and Israel, and despite numerous blocks in its implementation, and opposition from within the country. The main reason given for the propaganda against this program is the accusation that Pakistan is making atomic weapons behind the facade of peaceful use of atomic energy. This totally false and extremely prejudiced propaganda has been proved wrong by the facts available.

The real reason for this misunderstanding is the malicious intent of our enemies. Pakistan has achieved great success in finding a method for enriching uranium in spite of all hurdles. This success is credited to our country's great son and a realization of Quaid-e Azam's dreams, the great atomic scientist of the modern era, Dr Abdul Qadeer Khan. God-given capabilities, empathy, sensitivity, and cordiality have merged into his great personality and he has carried Pakistan to the level of developments in atomic science and industrialization that has opened new doors of prosperity for the 100 million people in our country. We can be sure now that with the help of God Pakistan will play the role in the renaissance of Islam for which this country was established.

The industrialized countries have devised a plan to deny Pakistan access to modern technology. There are many factors—political, social, economic, psychological—for this, but these factors also made it essential for us to develop atomic technology. The Soviet Union, one of our neighbors, is known as a superpower. In addition to being an atomic power it has also loaded India with weapons. India also became a mini superpower after the atomic blast in May 1974. At present in India there are 48 different atomic projects underway at various sites in Trombay, Madras, Tarapur, Kota, (Rajasthan), Naro [as published], Orissa, Bombay, Hyderabad, Nangal, Baroda, Talchhar, Rana Pratap Sagar, Matu Goru [as published], Rawat Bhatta, Thal West, Jadu Garh, Indore, Chitrapur and Srinagar. It would not be out of place to refer to the statement made by Raja Ramanna, head of India's Atomic Energy Commission, in the beginning of 1987. He said that from nuclear fuel to the development and construction of reactors India was not dependent on any country for atomic technology. According to international observers, India has the ability to make a hydrogen bomb.

We can assume from this background why the Kahuta plant is very important for Pakistan and why the people of Pakistan love and respect Dr Abdul Qadeer Khan, the creator of this plant. It would not be wrong to say that the Kahuta plant is the beating heart of Pakistan and Dr Abdul Qadeer Khan is its soul. India, with the help of its ally the Soviet Union, succeeded in separating East Pakistan from us in December 1971. India did not even consider it as a remote possibility that this tragedy would effect a son of Pakistan so much that "stars would rise from ashes" and that Pakistan would become an atomic power with the help of its centrifuge plant, and that the process for which England, Holland, and Germany cooperated for more than 20 years, had 25,000 scientist working, and spent over $200 million was to be attained within 7 years by the great son of this backward country!

Dr Abdul Qadeer Khan and Kahuta plant have almost the same story. Dr Qadeer Khan has also surmounted as many problems and obstacles as the Kahuta plant did. The story of Kahuta plant is the story of Dr Abdul Qadeer Khan. It is long and touching. When Dr Abdul Qadeer returned from Amsterdam in 1974, fate had given him the role that changes nations' fortunes. At that time we were involved in the reprocessing plant deal with France. Dr Khan advised some important people that we should build a plant to enrich uranium instead of a reprocessing plant. This advice was accepted and Dr Khan returned to Holland after giving important instructions, but the work on this plant did not make much progress. It was in July 1976 that the uranium enrichment project was separated from the Atomic Energy Commission and Dr Khan gave this project his revolutionary direction. [As the poet said], "Fellow travelers kept on joining and the caravan was formed." Dr Khan searched at home and abroad for associates who were not only hard working and bright, but were also determined to make Pakistan self-sufficient in the highly advanced area of centrifuge. At the same time engineering research laboratories were being built and the work on the first centrifuge laboratory was also going on. An experimental plant in Sihala was operating and blue prints for the Kahuta plant were being drawn. In 1978, the experiment to enrich uranium was successful and the first centrifuge laboratory was ready.

Finding the necessary equipment for the plant was another problem. Dr Khan knew all the companies that supplied these equipment. His connections in various countries, knowledge of several languages, and his attractive personality helped make this difficult task simple. He had an in-depth knowledge of the Western way of thinking because of his long stay in Europe. He knew the psychology of their shrewd business minds. He took full advantage of this knowledge. He never broke any country's laws while purchasing materials and equipment. He had to face problems because of the pressure applied by the United

States of America on Geneva, Ankara, Rome, Bonn, and the capitals of other countries to refuse selling this equipment to Pakistan. The United States got very angry and stopped economic aid to Pakistan in 1979. The Jewish-Hindu lobby led a propaganda tirade against Pakistan's enrichment plant unparalleled in modern history. Dr Qadeer Khan had some machines made locally under his own supervision. Dr Khan proved the Western view wrong that Pakistan was not able to make even a ball bearing, much less a centrifugal plant. Dr Khan himself made many electronic instruments including vacuums.

The member countries of the London Club wanted to keep this technology to themselves so that developing countries could not even dream about attaining this level of expertise. When these countries learned about Pakistan's ability to enrich uranium in 1979, they got a psychological shock to their feelings of superiority. They tried to put Dr Khan in the category of scientists who are serving jail sentences for selling atomic secrets to Moscow. The American Broadcasting Corporation, the BBC, Canada Radio and other news media began a very negative propaganda under the title of "Pakistan's Islamic Bomb." Holland sued Dr Qadeer on the basis of a letter Dr Qadeer had written 6 years earlier describing an acid for making a hole in steel plates. The case for stealing secrets was registered again Dr Qadeer in such a way that it did not allow him even to exercise his basic legal rights. The accusation of stealing secrets could not be substantiated; however, he was sentenced to 4 years of jail for the imaginary crime of carelessness in actions that might result in disturbing peace. The people of Holland condemned this decision as one-sided and unfair. Dr Qadeer requested the court for a defense attorney and even submitted a written request. The court ignored it.

This court case was not against a person, rather it was against the feelings of Pakistan as a nation. Western countries were looking for an opportunity to denounce Pakistan for a long time. The Government of Pakistan decided to appeal in a Holland court. Dr Qadeer also appealed through the Pakistani ambassador in Holland. During that time the Netherlands' foreign minister and the minister for development visited Pakistan and met some Pakistani leaders. Ghulam Ishaq Khan, then finance minister, told them that Holland had fallen a prey to the international propaganda efforts and that there was no truth in the allegations against Dr Khan. Dr Khan was summoned to appear in a court in Amsterdam in December 1985. The government of Pakistan refused to let him go to Holland for reasons of national interest and his own safety. The court dismissed all allegations against Dr Qadeer.

An advertisement appeared in the daily OBSERVER on 28 February 1987. This advertisement caused a havoc from the Pakistani embassy in London to the president's residence in Islamabad. The advertisement announced the publication next day of an interview with the mysterious Dr Qadeer, Pakistan's hero and the creator of the Islamic bomb, by Kuldip Nayar.

The Embassy through its sources learned that Kuldip Nayar had claimed in this interview that Pakistan had made an atom bomb. This interview was being published exactly at the time when the U.S. Congress was discussing the $4 billion aid to Pakistan. This interview could have caused serious problems for Pakistan. President Ziaul Haq was greatly disturbed by this information. His experience and knowledge told him that India had shot another arrow against Pakistan. He sent a message to Dr Khan to see him. Dr Qadeer had already learned about this from London so he understood the reason for this visit. He had never given any interview to Kuldip Nayar, therefore he was not worried. The President listened to all the details and advised him to avoid the foreign press.

This alleged interview was published in THE MUSLIM and in Lahore's NATION and along with the OBSERVER. Our intelligence agencies were in a state of turmoil. They wanted to know how an Indian journalist could succeed in crossing all security measures. The officials learned that Kuldip Nayar had succeeded in reaching Dr Khan through Muhahid Hussain, editor of THE MUSLIM. Our policy-makers were worried that on the pretext of the news about Pakistan making the atom bomb, India cuold attack Kahuta with the help of some big power. According to a senior journalist, "that night was very heavy for Pakistan." Rumors were rampant. The pride of Pakistan Air Force took to air to pay tribute to their country with their blood.

The whole facade of the alleged and imaginary interview was exposed by Dr Qadeer Khan's one statement. He said that a friend had visited him about 45 days earlier to invite him to his wedding. He was with another person whom he did not know. He was introduced as Mr Nayar. Dr Khan learned while drinking tea with them that this person was Kuldip Nayar, an Indian journalist. The friend who had brought this Indian journalist to Dr Qadeer Khan was Mushahid Hussain, editor of THE MUSLIM. When he took Kuldip back to his home, Kuldip Nayar called the Indian ambassador S.K. Singh and told him to send him a car and he would eat dinner with him. This was some code word or a secret signal. The Indian ambassador knew of Kuldip Nayar's mission. Kuldip Nayar gave his "story" to Mr Singh, who sent it to Delhi and the final draft was prepared in a joint meeting of the experts in the defense and foreign ministries. Kuldip Nayar earned 5 ½ lakh rupees for this story.

A close look at the Kuldip Nayar drama makes us wonder why this "interview" taken on 28 January was not published until 1 March. According to a deputy editor of the OBSERVER, the editor of the newspaper was not willing to buy this scoop for which Kuldip Nayar was demanding 15,000 pounds. The editor was not willing to publish such a story without some proof. Kuldip Nayar discussed the issue with Shyam Bhatia, a journalist working for the OBSERVER. Shyam Bhatia was aware of his editor's weakness for women. He arranged for the editor to meet the notorious call girl

Pamella in a club. The story was sold at the asking price as these meetings became a routine.

Not only the Hindu and Jewish lobbies, the Western press, and the superpowers have been busy in making mischiefs and conspiring against Dr Khan, but some of our "own" people are also involved. One of these people who disgraced Pakistan to foreign buyers is Dr Munir Ahmed. Dr Ahmed is the head of the Atomic Energy Commission and considers making problems for Dr Qadeer as his primary duty. According to the authors of "The Islamic bomb" the former chairman of of the Atomic Energy Commission, Dr I.H. Usmani, considered Dr Ahmed a liar and a selfish person. His actions havebrought disgrace to Pakistan.

Dr Qadeer's name was once included on a list for presenting the highest civilian honor. This list was to be considered by a cabinet level awards committee. Dr Munir Ahmed's favorite assistant Aftab Khan made fun of Dr Qadeer by calling him "that Bhopali" and removed his name from the list.

The other leader of the anti-Kahuta lobby is Dr Abdul Salam. It is an open secret that he is opposed to Pakistan becoming an atomic power. Dr Salam always visits Dr Munir Ahmed in the Karachi guest house of the Atomic Energy Commission whenever he visits Pakistan, and then heads straight to India. Munir Ahmed has but one desire. He wants to take the credit for all achievements in the field of atomic energy.

The position of Dr Abdul Qadeer Khan in our country is like a demigod of science. Millions of men, women, old people, and young children in Pakistan want to see him. Whenever he is seen in public people run to kiss his hand and bless him. The journey that science and technology started under Dr Abdul Qadeer Khan's leadership a few years ago has come a long way. Where is this caravan of great love now?

Pakistan, by the grace of God, has acquired the nuclear capability now. There is no difference between this ability and the ability to make an atom bomb. However, there is a difference in desire for making bombs and acquiring nuclear capability. According to Dr Qadeer, Pakistan has the expertise to enrich uranium using the centrifuge technique. We have left India behind by many years in this very complicated and difficult technology. India cannot catch up with us now no matter how hard it tries. Our expertise means that we can make not only atom bombs but also hydrogen bombs. According to foreign observers, we are not only enriching uranium in Kahuta, but are making mini and micro computers. According to them Pakistan will be entering the space in the near future. The successful experiments like Hatf 1, Hatf 2, Albadar and [word indistinct] support these observations.

Why does not then Pakistan exploade an atomic bomb? Pakistan is against the atomic weapons race. However, we have to hope for the best and be prepared for the worst. Pakistan cannot turn back from where it has arrived today. All our neighbors have atomic weapons and the world will not come to an end if we also make them! Our patriotic duty is to exploade a bomb and end all the dangers. We cannot expect humanistic and gentle relationship from the nuclear India with the non-nuclear Pakistan. We must have all the weapons that our enemies have.

We should also pay attention to the other areas of nuclear research in addition to an atomic explosion. The program in nuclear research and development must continue. We have to update our atomic energy division for helping our electricity production and industrialization.

If Kahuta can achieve the impossible, then why cannot it help get the country rid of the evil of load shedding? Prime Minister Benazir Bhutto will have to make courageous decisions. Her name will be written in gold in our nation's history.

Anti-Kahuta Lobby Within Pakistan— Countries opposed to Pakistan's atomic program have been active in making sure that Pakistan does not make progress in this area. These countries include the Soviet Union, India, Israel, and the United States of America. The Soviet Union and India have their connections in Pakistan and they are in a position to achieve their desired goals with the help of their agents. The United States has all the privileges in Pakistan because of its position as a friend and an ally. This is supported by the fact that Americans or their representatives are almost always present at the high level meetings conducted in connection with Kahuta. Once when General Zia was discussing a very delicate matter pertaining to Kahuta with a senior military officer, he mentioned a very high level Kahuta board member and said: "That bastard is a CIA agent. Tell Dr Khan never to say anything important in his presence."

The Model of the "Islamic Bomb"—Once a very senior Pakistani diplomat was talking about some interesting affairs with some U.S. officials during his trip to the United States. The U.S. officials began to talk about Pakistan's atomic program. According to this diplomat, the U.S. officials threatened that it would become very difficult for the United States to continue thier aid if Pakistan did not stop its nuclear program.

The CIA officer told him that they had not only the whole details about our atomic program but also the model of the "Islamic bomb." The official invited him to an adjoining room. The diplomat went to that room with other American officials. The CIA officer angrily jerked away a partition and revealed the model of the Kahuta atomic plant. A football shaped thing was on a stand in the other corner. The official said that was the Islamic bomb and asked if we Pakistanis still denied the existence of a bomb. When they were returning through the hall, he added that they had irrefutable proof of its existence. .

[Box, p 8, untitled]

Where would we be today if nature had not taken pity on our helplessness and given us Dr Abdul Qadeer Khan, who is like a bright spark in our bed of ashes? Our neighbor India had an atomic blast in 1974. It has 48

nuclear installations working round the clock in nuclear research and development. India claimed ability to make a hydrogen bomb 2 years ago. We have to admit that God gave us Dr Abdul Qadeer Khan to save and protect our nation. We cannot thank God enough for this great gift.

Dr Abdul Qadeer Khan started with the great ambition of making Pakistan a nuclear country in the face of resources not even worth mentioning. He surmounted all difficulties and the great deeds he has done in less than 7 years are mind boggling and should be written in gold in the history of our nation and the Third World. It is thanks to Dr Khan's miracle that Pakistan is able to maintain its free sovereign status alongside the superpowers and the mini superpower that is India.

The presence of Dr Abdul Qadeer Khan is the fulfillment of our wishes, of our hopes for a bright future, and of the dreams of the father of our nation. For this reason, HURMAT considers it its national duty to write about Dr Khan's deeds and tell the world about him. HURMAT's sister English newspaper PAKISTAN OBSERVER is also dedicated to publicizing Dr Khan's great deeds. This feeling resulted in the editor of HURMAT authoring the book now published as "Dr Abdul Qadeer Khan and the Islamic Bomb." Two editions of this book are already sold out. Mr Zahid malik is one of the oldest admirers of Dr Khan and he considers it his religious duty to write about Dr Khan. Weekly HURMAT and its sister newspaper PAKISTAN OBSERVER have published several interviews with Dr Khan. This feature based on the book is being presented for the readers of HURMAT, especially those living abroad, for their information and interest.

[Box, p 9]

Had General Zia Lived One More Day!

The late General Zia had become very unpopular with the Hindu-Jewish lobby and the opponents of Pakistan's nuclear program because of his interest in the Kahuta plant, uranium enrichment, and pushing Pakistan into the nuclear era. When Israel was positive that Pakistan will continue its Kahuta project despite U.S. opposition, it decided to remove General Zia. Israel planned "Mission Red" which was assisted by an anti-Zia Pakistani diplomat and an Indian diplomat. After some changes, this plan was finalized in Paris when all angles had been given due consideration, the Indian diplomat went to Israel where he was given the gadget that destroyed the C-130 airplane. The Indian diplomat called the Pakistani diplomat stationed in Europe over the telephone when he received this gadget. Israeli secret agents recorded this conversation. They also videotaped the ceremony when this matchbox sized gadget was given to the Pakistani diplomat.

President Zia had picked up some information about this plan. Had he lived one day more, he would have broken certain links in "Mission Red". Later on, General Akhtar Abdul Rehman, who was also killed in this plane, would have revealed this conspiracy.

[Box, p 10]

Dr Abdul Qadeer Khan According to his Wife Heni Khan

Dr Khan's wife, Mrs Heni Khan, is Dutch by birth. She has many relatives in Holland, but, there is only one aunt who is a close relative. According the Heni Khan she met Dr Khan in 1962 in Holland where he had gone for vacation while living in Germany. Dr Khan was a lonely young man who missed his country. "We both agreed that we must try to understand each other thoroughly. I got a job in Berlin and we were married after a while. Dr Khan was 27 and I was 21 years old at that time. Dr Khan got his doctorate in 5 years instead of the usual 7 years. We returned to Pakistan in 1976 and it took 9 months to settle down. I do not really understand the technical aspects of Dr Qadeer's projects, but I am aware of various aspects and problems associated with them. I am aware of what is happening in general. He had dreams about this project for a long time and it makes me very happy to see that he has achieved what he had wanted to achieve for such a long time. This will continue and it makes my husband very happy. I am very well aware of Dr Khan's qualities, and one of them is that he always wants to help others. The evenings at home are spent reading literature or biographies. He also writes. He does not use a desk or a table and always writes using his knee as a brace for paper. Dr Khan also has a very keen sense of humor.

My husband is a great man, and is greater in intrinsic qualities..."

[Box, p 11]

Mercy Appeal for Bhutto

Dr Abdul Qadeer Khan was one of the people who believed that all the [anti-Bhutto] activities (to use Mr Bhutto's words) were to break my limbs." He believed that the final step to hang Mr Bhutto and destroy him would never be taken. Dr Khan had told his wife Heni Khan and a couple of close friends that hanging Bhutto would be a great shock to him. He called Bhutto the creator of Kahuta. Dr Khan once said that it was correct that God had helped him to do all this work to protect this land, but "I believe this miracle could not have been achieved without Zulfiqar Ali Bhutto's support."

Dr Abdul Qadeer was greatly upset when the Supreme Court rejected Mr Bhutto's appeal. He had an appointment to see the president of Pakistan. He discussed the issue with some close friends and decided to appeal to the president for leniency toward Mr Bhutto. He spent every second thinking about this for 2 days before his meeting with the president. The night before the meeting he prepared a written appeal. He was sure that the

president would pardon Mr Bhutto if he read the petition. After the meeting he pulled out an envelope from the inner pocket of his jacket and told the president that he was very thankful to him and would like him to read that statement during his spare time. When he met again with the president a month after Mr Bhutto was hanged, the president as usual walked him to his car. The president patted him on the shoulder and said, "I did read your petition and I think you are a good lawyer in addition to being a good nuclear scientist!"

[Box, p 12]

Mrs Benazir Can Become Pakistan's Mrs Thatcher

For energy purposes only 1000-watt light water reactors can be beneficial for Pakistan in the present situation. We can be self-sufficient in atomic fuel required for these because of the Kahuta plant. According to Dr Khan, Kahuta's scientists and engineers can build these reactors from indigenous resources. All they need is the permission to do so. Instead of making them work for some projects for demonstration purpose and wasting time, we must focus on fully utilizing the capabilities of Kahuta's scientists and engineers. Their responsibilities should be increased. If Kahuta can achieve the impossible, it can also free the country from the evil of load shedding. All that is needed is to make some proper decisions. It would be better to reorganize the Atomic Energy Commission and make Dr Qadeer Khan its head. The Kahuta plant was started by Prime Minister Zulfiqar Ali Bhutto. If his daughter, keeping in mind the broader interests of the nation, decides to have a nuclear explosion, her father's soul will rest in peace. Madam Bhutto will also gain the important place in our history that she appears to want. If she makes some great decisions like this, she could become Pakistan's Mrs Thatcher!

[Box, p 13]

What Was in the Rock?

A young shepherd in Kahuta sat down on a large rock to rest. The road next to where he was sitting led to the research laboratories headed by the world famous scientist Dr Abdul Qadeer Khan. He began to sharpen his axe on the rock without thinking. The shepherds usually have a very sharp sixth sense. Perhaps that is why many of our prophets were required to look after the sheep before they were made prophets! The sound from the contact with the rock was ominous and the shepherd become alert. His father was a maulvi in the mosque who also helped the security personnel at Kahuta with some chores. He had told his son to always keep his eyes open because the enemy was lurking around. The shepherd got very curious. He looked at the rock carefully and tried to lift it. He was surprised to find the rock a lot heavier compared to its size. He was not suspicious anymore and his sixth sense told him that this was not a rock but something else. He took the rock to his father and this rock reached the experts through the security personnel. They decided to open it and found a transmitter and some very sensitive instruments whose functions were identified later. These instruments could tell and record the type of enrichment and amount of uranium in any truck going on the road. The transmitter would then send the accumulated information to the country that had planted this "rock." In addition, these instruments would also record and inform about any nuclear blast. The late General Ziaul Haq shared these facts with me. He had smiled and said that he had shared this information with Dean Hinton, the American ambassador. Zia said he had told Hinton that if they planted another rock, it too would be picked up within hours. Dean Hinton looked ashen.

Development of Nuclear Power Plants Approved

BK1808010089 Hong Kong AFP in English 1912 GMT 17 Aug 89

[Text] Lahore, Pakistan, Aug 17 (AFP)—Pakistan has approved a five-year programme aimed at developing the capability to design and manufacture its own nuclear power plants, the chairman of the Pakistan Atomic Energy Commission has said.

Munir Ahmed Khan said late Wednesday that the programme was needed to ensure that Pakistan would have control over its own energy resources.

Mr Munir, speaking to reporters after a regular meeting of the commission, said that Pakistan had for a long time been denied nuclear technology by advanced countries.

"Hopefully that situation had changed," he said, adding that during Prime Minister Benazir Bhutto's visit to France last month, negotiations on the purchase of a 900-megawatt nuclear power house took "fairly concrete shape."

He said he hoped that by the time President Francois Mitterand of France visited Pakistan early next year, the deal would be finalised.

Nuclear power was an absolute necessity for Pakistan, which will need an additional 20,000 megawatts of electricity over the next decade, Mr Munir said. Such a supply could only come from nuclear power, he added.

Defense Spokesman Raps IJI Leader Statement on Nuclear Plant

BK0409164289 Islamabad Domestic Service in English 1600 GMT 4 Sep 89

[Text] A spokesman of the Defense Ministry has taken strong exception to the press statement issued by a leader of the IJI [Islami Jamhoori Ettehad—Islamic Democratic Alliance] parliamentary party in the National Assembly, Chaudhry Shajat Hussain, claiming that the PPP [Pakistan People's Party] had conspired with India to launch a mock attack on Kahuta [Nuclear] plant.

He said this [word indistinct] statement is outrageous and a figment of the imagination of the IJI leader. The IJI leaders, bereft of real issues, are now desperately fabricating malicious stories against an elected representative government even at the cost of compromising national security. The IJI leader did not disclose the source of his information, as none exists. He has levelled the false and malicious allegation without caring for its implications. The spokesman said that under the elected government all steps have been taken for protection of our vital installations.

Experts To Decide Fate of Nuclear Station

LD2908173889 Moscow TASS in English 1654 GMT 29 Aug 89

[Text] Moscow August 29 TASS—A group of independent expertise of the International Atomic Energy Agency (IAEA) is to decide the destiny of a nuclear heat supply station (NHSS) whose construction was started in Gorkiy, the Volga area. The group includes experts from the USA, Great Britain, Spain, France, Canada, Poland, Czechoslovakia, Finland and is headed by Michael Hayden of the USA. The group of experts is now concluding its second visit to the USSR, TASS learned from the centre of public information on nuclear energy.

The 16 qualified experts on the group are now at the station's site. Prior to the trip to Gorkiy, the specialists familiarised themselves in detail with design and construction documents at Moscow organisations.

The experts' conclusions will depend on many factors—the correctness of the choice of the building site, quality of work, observance of all hygienic standards, the impact of the future station on the environment. The opinion of people of Gorkiy will be taken into consideration. Experts of IAEA are to meet the press and public of the city on Wednesday. Everyone will be able to state his or her opinion on the problem. Following the debate the experts will make the final decision.

EUROPEAN AFFAIRS

EC Council Decision on TELEMAN Program

AN890276 Luxembourg OFFICIAL JOURNAL OF THE EUROPEAN COMMUNITIES in English No L226 3 Aug 89 pp 16-20

[EC document: "Council Decision of 18 July 1989 Adopting a Research and Training Programme for the European Atomic Energy Community in the Field of Remote Handling in Hazardous or Disordered Nuclear Environments (1989 to 1993)—TELEMAN"]

[Text] The Council of the European Communities,

Having regard to the Treaty establishing the European Atomic Energy Community, and in particular Article 7 thereof,

Having regard to the proposal from the Commission, submitted after consulting the Scientific and Technical Committee,

Having regard to the opinion of the European Parliament,

Having regard to the opinion of the Economic and Social Committee,

Whereas, by its Decision 87/516/Euratom, EEC as amended by Decision 88/193/EEC, Euratom, the Council adopted a framework programme for Community activities in the field of research and technological development (1987 to 1991), which acknowledges the importance of contributing to improving the level of scientific and technical knowledge relevant to nuclear safety;

Whereas the inherent radioactivity of nuclear plants makes remote handling essential for the conduct of nuclear operations on an industrial scale;

Whereas the safety of nuclear installations and protection of their environment depends on operators being able to inspect, maintain and repair plants when necessary;

Whereas exposure of man to radiation should be kept as low as reasonably practicable;

Whereas an action in research on remote handling in hazardous and disordered nuclear environments offers an opportunity to realize these goals more efficiently;

Has adopted this directive:

Article 1

A specific research and training programme (TELEMAN) for the European Atomic Energy Community in the field of remote handling in hazardous or disordered nuclear environments, as defined in the Annex, is hereby adopted for a period from 18 July 1989 to 31 December 1993.

Article 2

The funds estimated as necessary for the execution of the programme amount to ECU 19 million, including expenditure on a staff of four.

An indicative allocation of these funds is set out in the Annex.

Article 3

Detailed rules for the implementation of the programme and the rate of the Community's financial participation are set out in the Annex.

Article 4

The Commission shall be assisted in the implementation of the programme by the Management and Coordination Advisory Committee CGC-5 for Nuclear Fission Reactors and Safety, Safeguards and Fissile Materials Management, set up by Council Decision 84/338/Euratom, ECSC, EEC of 29 June 1984 dealing with structures and procedures for the management and coordination of Community research, development and demonstration activities.

Contracts concluded by the Commission shall govern the rights and obligations of each party, in particular arrangements for the dissemination, protection, and exploitation of research results.

Article 5

In the third year of implementation, the Commission shall undertake a review of the programme and send a report on the results of its review to the European Parliament, the Council, and the Economic and Social Committee. This report shall be accompanied, where necessary, by proposals for the amendment or extension of the programme.

At the end of the programme, an evaluation of the results achieved shall be conducted by the Commission, which shall report thereon to the European Parliament and the Council.

The abovementioned reports shall be established having regard to the objectives set out in the Annex to this Decision and in accordance with Article 2 (2) of Decision 87/516/Euratom, EEC.

Article 6

This Directive is addressed to the Member States.
Done at Brussels, 18 July 1989.
For the Council The President R. Dumas

Annex

Programme Objectives, Contents, Implementation, Indicative Allocation of Funds, and Evaluation Criteria

1. Objectives

TELEMAN's objective is to realize advanced teleoperators that respond to the ultimate needs of the

nuclear industry in order to reinforce the scientific and technological base used for the design of nuclear remote handling equipment. Tele-operators contribute to the safety and profitability of man and plant employed in all parts of the nuclear industry, from mining through reactor operation to reprocessing and decommissioning. This programme concerns the contribution that tele-operators can make to nuclear safety in the areas of accident management where the environment may have changed unpredictably and decommissioning, including prevention, inspection, and maintenance.

The tele-operators of interest are mechanical arms to which a variety of tools and sensors can be attached, manipulators attached to movable gantrys, and partially auntonomous vehicles equipped for specialized jobs.

In particular, TELEMAN will help the nuclear industry to comply with the requirements that workers be exposed to the minimum practicable amount of radiation, always remaining within relevant limits, without compromising inspection, maintenance, and repair operations.

2. Programme Technical Content

Program Areas and Indicative Allocation of Funds (in millions of ECUs)

Area 1: Tele-operator component and sub-system development **8.8**

In the framework of the abovementioned nuclear safety objectives, research and development will be carried out on the utilization, modification and, where necessary, the development of sensors, perception and decision-making systems, information transmission, and engineering for tele-operator mobility and dexterity in nuclear environments.

Area 2: Environmental tolerance **2.5**

Research will be carried out throughout the life of the programme on the adaptation of sensors and electronic hardware to nuclear environments, the development of machine monitoring systems and design strategies that permit easy repair or recovery of stranded machines.

Area 3: Research machine projects **6.4**

Development will be focussed on tele-operators that respond to the demands of the nuclear industry for enhanced safety. These will be defined in consultation with end-users who in turn will be expected to test new tele-operators in their installations (cf. Area 4). Definition of industry's needs will precede the launching of research in Areas 1 and 2. Products of research on components and sub-systems wil be demonstrated by incorporating them into research machines that already exist or into new machines that typify nuclear industry requirements, such as intelligent manipulators and cranes equipped with control systems suitable for use in high-radiation fields, and a mobile platform for information gathering under normal and abnormal conditions.

Area 4: Product Evaluation and Studies **1.3**

End-users of TELEMAN technology will be encouraged to test and evaluate the practicality and reliability of the products of the programme in realistic environments to guide the subsequent commercialization of successful ones by industry. Studies will be made of topics relating to the application of new technologies, new uses for computer-assisted tele-operators, the evolution of guidelines and standards and programme development.

TOTAL **19.0**

3. Implementation

The programme consists of activities carried out by means of shared-cost research contracts with competent public organizations or private firms established in the Member States. The participation of small and medium-sized enterprises in the programme will be encouraged.

The Commission shall distribute, in all Community languages, information packs to accompany the invitation to participate in order to guarantee equal opportunities for the undertakings, universities, and research centers in the Member States.

In addition to shared-cost research contracts, the programme may also be carried out by means of study contracts, coordination projects, and awards of training and mobility grants. Such contracts and grants shall, where appropriate, be awarded following a selection procedure based on calls for proposals published in the OFFICIAL JOURNAL OF THE EUROPEAN COMMUNITIES.

Participants in shared-cost contracts may be industrial organizations, research institutes, and universities established in the Community. Each contracting party will be expected to make a significant contribution to projects. The contracting party shall be expected to bear a substantial proportion of the costs, 50 percent of which shall

normally be borne by the Community. Alternatively, in respect of universities and similar organizations carrying out projects, the Community may bear up to 100 percent of the additional expenditure involved.

Shared-cost research projects should, where appropriate, be carried out by participants from more than one Member State.

The information resulting from the implementation of the shared-cost activities shall be made accessible on an equal basis to all Member States. Licences and/or other rights developed in the framework of the programme will be subject to the normal contractual conditions of the Community.

4. Evaluation Criteria

The Commission requires that, where possible, the objectives and milestones of each research programme be set out in a quantitative form to facilitate evaluation.

The long-term objectives (2000) are that operators of nuclear installations should be able to buy world-class computer-assisted tele-operators from Community-based manufacturers and that the radiation exposure of workers should be appreciably reduced.

TELEMAN's principal technical objectives relate to reinforcing the scientific and engineering base upon which the design of nuclear remote handling is based, to solving problems of manipulation, material transport, and mobile surveillance within the nuclear environment, and to demonstrating the feasibility of the solutions offered.

The technical criteria in terms of which the different aspects of the programme are to be evaluated, initially in 1992 to 1993 and more thoroughly in about 1996, are:

- The extent to which projects were selected against credible technical criteria;
- The development achieved within TELEMAN projects, e.g., whether TELEMAN projects achieved a significant (100-percent) improvement in performance/price ratios. Typical performance parameters might be sensor resolution, power/weight ratio, system response time, etc.;
- The extent to which different technologies have been integrated;
- The performance and acceptance of research machines in tests conducted with the participation of potential end-users;
- Whether the projects were of high scientific value as judged by the number and impact of patents, publications in referred journals, and invited contributions to conferences. Output should be compared with that from other similar programmes being executed elsewhere.

TELEMAN's industrial objectives relate to more effective application of investment in research, generation of awareness of the potential of computer-assisted tele-operators, and creation of a pool of experienced firms and engineers able to exploit research machines and manage the application of new technology.

The industrial criteria in terms of which the different aspects of the programme are to be evaluated are:

- Whether the calls for proposals attracted sufficient industrial interest to permit formulation of a coherent programme. The criterion of sufficiency would be that the ratio of resources proferred by industrial contractors to Community funding is to be greater than 1.5;
- The extent to which projects were selected against credible industrial criteria;
- That at least half the proposals received envisage a major role for a university or research laboratory in a Member State other than that of an industrial partner;
- The extent to which links formed to execute TELEMAN projects have continued and led to joint development of industrial products, new multinational firms or new research projects;
- Application of technology and patents arising from TELEMAN are applied by other firms and in other industries.

NORWAY

Better Preparedness for Nuclear Accidents Urged

51002437 Oslo AFTENPOSTEN in Norwegian 16 Aug 89 p 4

[Unattributed article: "Better Preparedness Against Nuclear Accidents"

[Text] Preparedness against nuclear accidents must be bettered in Norway in general, and in Finnmark in particular says director of the State Nuclear Supervisory Commission, Knut Gussgard to NTB [Norsk Telegrambyro]. Gussgard discussed the consequences of a nuclear accident with the political leaders in Finnmark on Tuesday.

Accidents involving three Soviet nuclear submarines have caused concern among residents in our northernmost county. They are also uncertain about what could happen at the Soviet nuclear power plant at Kola Peninsula, a mere 300 km from the Norwegian border.

At the meeting in Vadso the director, Gussgard, stated that preparedness against nuclear accidents could be sharpened by many means. Continuous testing of the radioactive content of the air and sea water should be set in motion.

UNITED KINGDOM

Atomic Energy Head Scores Cut in Funding

51500174 London THE DAILY TELEGRAPH in English 3 Aug 89 p 4

[Article by Steve Connor, technology correspondent: "Nuclear Industry in 'Serious Difficulty'"]

[Text] The nuclear industry faced "serious problems" due to the Government's privatisation programme that

required urgent solutions, Mr John Collier, the chairman of the Atomic Energy Authority, said yesterday.

The Government's decision to cut research into nuclear fusion and fast reactors, and the planned privatisation of the electricity supply industry, threw research and development of nuclear power into doubt.

"It is very unfortunate that these cuts are being put into effect at a time when the privatisation of the electricity supply industry is adding to the other uncertainties in the nuclear industry." Mr Collier said on the publication of the authority's annual report.

The Government said last year that it would reduce its spending on research into fast reactors from £50 million a year to £10 million, and would end altogether its funding of the prototype fast reactor at Dounreay by 1994.

But Mr Collier said that if the Government wanted to promote nuclear power as a clean alternative to fossil fuels, then it must reconsider its plans to cut the fast-reactor programme.

"The most serious of a number of Government decisions which have affected us over the last year has been a significant reduction in funding for the fast reactor R and D programme."

In the authority's report, Mr Collier said Government decisions had "seriously affected our future business prospects in the short term and will require massive and sustained changes in the authority".

Turnover of the authority was only marginally higher this year, at £438 million, with operating profits at £12 million.

But the accounts recorded a current loss of more than £41 million because of restructuring costs that had arisen from cuts to the fast reactor and fusion programmes.

The authority had already shed about 2,000 jobs and expected to lose up to 1,500 more to bring its staff levels down to about 10,000 by 1993.

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